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Non-Kinetic Capabilities for Irregular Warfare: Four Case Studies

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PREFACE

This paper was prepared under the Task Order *Technology Initiatives for Improving Non-Kinetic Capabilities for Irregular Warfare*[1] for the Director, Defense Research and Engineering (Director, Rapid Reaction Technology Office; Chairman, Combating Terrorism Technology Task Force). The authors are pleased to acknowledge the support and guidance of the study's sponsor, Mr. Benjamin Riley.

Although all co-authors collaborated on all sections of the report, the principal authors for each case study are as follows:

- II. *Influencing the Population*: Lead author Sue Numrich (snumrich@ida.org) with contributions by Joel Resnick (jresnick@ida.org)
- III. *Unity of Effort in Civilian-Military Actions*: Lead author Stephen Ouellette (souellet@ida.org) with a list of IDA resource documents by Martin Lidy
- IV. *Countering Corruption in Host Nation Police Forces*: Lead author Christine Bucher (cbucher@ida.org) with contributions by Joel Resnick
- V. *Vehicle Identification and Tracking*: Lead author Bill Hurley (whurley@ida.org)

Questions and comments on specific case studies should be addressed to the lead authors.

As part of this effort, the study team collaborated in a parallel study of approaches to countering corruption in host nation police forces. This study was led by Mr. Gary Markovits of Innovation Business Partners, Inc., who worked with Dr. Kathleen Kiernan of The Kiernan Group to organize a group of law enforcement officers, many with recent experience regarding police forces in Afghanistan. In two workshops Mr. Markovits focused the group on the challenges of countering corruption in host nation police forces and then identified and assessed a number of technologies that are currently available and that could be applied to the counter-corruption challenge. The results are described in a

[1] Contract No. DASW01-04-C-0003.

separate Innovation Business Partners, Inc., report[2] and are briefly summarized in a subsection of Chapter IV of this report. The authors are pleased to acknowledge these contributions of Mr. Markovits and Dr. Kiernan to this report.

The authors would like to thank the study's reviewers for their careful reading of the manuscript and thoughtful comments. They are: Dr. Theodore S. Gold (senior reviewer), Mr. John Tangney (Influencing the Population), Mr. A. Martin Lidy (Unity of Effort in Civilian-Military Actions), and LtCol James A. From, USAF (Countering Corruption in Host Nation Police Forces).

During the course of the study the authors benefited from the input of many other individuals. Special thanks are due to: Maj Robert Castro, USMC; Maj John K. Kelly, USMC; Dr. William M. Knarr; Mr. D. Larry Sampler; Mr. William B. Simpkins, and the paper's editor, Ms. Patricia G. Phillips.

[2] Innovation Business Partners. Inc., *Countering Corruption in Host Nation Police Forces*, Final Report, October 2008. Contact Info@InnovationBP.com or (914) 474-9499.

CONTENTS

Appendixes

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

"Kinetic" capabilities focus on destroying enemy forces through the application of physical effects. For the purposes of this study, we take "non-kinetic" capabilities to be all other capabilities relevant to irregular warfare (IW). For example, a major U.S. objective in IW is to strengthen a host nation government (HNG) and its underlying society to enable them to resist insurgency, terrorism, or criminality. Both kinetic and non-kinetic capabilities can contribute to this objective, but non-kinetic capabilities will often play the dominant role. However, non-kinetic capabilities are *not* traditional focal points for DoD development programs. DoD must improve such capabilities if experiences in the first decade of the 21st century are indicative of future national needs. Such improvement will require initiatives across the full range of DOTMLPF+ categories.[1] In particular, a key question is "How should DoD's investments in science and technology (S&T) be modified to better address the emerging needs for improved non-kinetic capabilities?"

This study explores four key focus areas of IW: influencing the population; unity of effort in civilian-military actions; countering corruption in host nation police forces; and vehicle identification and tracking. The first three relate, respectively, to three principal dimensions of IW: (1) human terrain and the centrality of the population in IW, (2) civilian-military actions and the critical importance in IW of establishing unity of effort from disparate organizations, and (3) the HNG whose stability and legitimacy in the eyes of the population are overarching objectives of IW, yet are often threatened by endemic corruption. The fourth focus area, vehicle identification and tracking, takes a different perspective. Instead of emphasizing IW needs and identifying capabilities, it focuses on a capability and identifies its applications to IW needs. In each case, the study examines the structure of the focus area, identifies key capabilities, and suggests directions for S&T initiatives.[2] Specific S&T proposals are not described. The following four sections summarize the results.

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1 DOTMLPF+: Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities plus other areas such as planning, policy, interagency and multinational coordination, and experimentation.

2 Because of the nature of IW, we take the term "S&T" to include both traditional applications of the physical sciences and engineering as well as applications of life, psychological, and social sciences.

A. INFLUENCING THE POPULATION

The capabilities and associated S&T thrusts explored in this case study are based on the premise that the ability to work with the local population and the HNG is critical to success in many aspects of irregular warfare. This is particularly important for countering insurgencies and building a foundation for long-term stability. The fundamental thesis is that the US should not be seeking to win the hearts and minds of the people, but rather should work to help the HNG develop the capacity to provide for the security and basic needs of the whole population and thereby to help the HNG win the hearts and minds of its own people. To achieve that goal, it is necessary for the US to understand the various segments of the population and their needs. It is also necessary to assess the capability of the HNG to address those needs. Clear understanding is often hampered by tacit assumptions; thus, frameworks that expose assumptions and aid users in enumerating factors that influence both the population and the HNG must be developed. Finally, as the expertise and information needed to provide context and inform models is distributed, the US must develop networks of expertise and the infrastructure to support them. Thus, the following four capabilities cited:

- Improved methodologies for assessing the population's attitudes
- Data to objectively assess public services provided by the HNG
- Models and tools for influencing the population's attitudes and actions
- Forward headquarters and units with reach-back to these methodologies, data models, and tools

are directed toward creating a clear understanding of the population and capabilities of the HNG and putting that understanding at the service of military decision-makers.

Science and technology have much to contribute in support of these capabilities. The specific thrusts examined in this document represent a focused subset, not a comprehensive list. The focus is on the S&T efforts that

- Provide the infrastructure for storing, managing, manipulating, and sharing data and information
- Enable the rapid acquisition of multi-source, multi-lingual information
- Assist in the collection and integration of structured data from multiple, diverse sources
- Develop the means for semi-automation of the human-intensive process of reducing unstructured media information into machine-usable structured data

- Support the formation of federated, information-sharing capabilities within DoD and externally with other agencies, coalition partners, and any who can contribute expertise in support of the capabilities.

While pointed along common vectors, the S&T thrusts are multi-disciplinary, ranging from social science to computer science, and include every category from basic research to prototypes involving existing technology. As a move toward implementation, Table ES-1 categorizes the S&T thrusts as short-, mid- and long-term efforts. Short-term efforts could be begun now and produce results in 12-18 months. Mid-term efforts require more time to mature. Long-term efforts either require considerable basic research or involve socialization across a diverse community before they can be implemented.

Table ES-1. Science and Technology Thrusts

S&T Thrust	Term	Comments
Development of a prototype, common, socio-cultural taxonomy	Short-term	Several RRTO programs have produced a good start, but coordination is required among the several groups bent on independent development efforts.
Better language translation capability	Short-term	Much work has already been done, but more key languages must be addressed.
Exploitation of statistical linguistic analysis	Short-term	This field is ripe for maturation, and we need to understand how far and fast it can be pushed.
Development of data coding expertise	Short-term	While the need for new coding expertise will grow as our appetite for new data increases, training in data coding can begin now starting on the work done for terrorism.
Collaborative relations with a major polling company	Short-term	Establishing a research "seat" with a polling company could open this type of information to the research community whose results can inform operational use.
Improved methods for eliciting expert knowledge	Short-term	Compilation of best practices from the research community in combination with techniques used by the military and intelligence communities could be started.
Operational use of high-quality statistical models	Short-term	Incorporation of some of these models into a toolkit with instructions for use and built-in evaluation tools can be started now.
Immersive, interactive training capabilities	Short-term	Much of the technology already exists, but its employment requires careful definition of what needs to be absorbed by the student and how that will be tested.
Prototype Federation with automated rules for secure information interchange	Mid-term	The technology is ready, but the formation of the Federation requires some socialization and development of acceptable security exchange agreements.
Development of a comprehensive, mature socio-cultural ontology	Mid-term	The initial prototype will expose undefined concepts and relationships and push the operational community to determine what data are required at different echelons and for different missions.
Collection of structured data: specify key structured data sets and develop filters	Mid-term	Many of the data sets are known. Filters require a defined taxonomy and data format for the destination data before they can be written.
Game theoretic analyses	Mid-term	New models capable of multi-sided gaming are now being developed but must undergo careful testing before being accredited for operational use.

Table ES-1. (continued)

S&T Thrust	Term	Comments
Operational employment of agent-based models	Mid-term	Most models require development of an analytic framework around them with some relatively accessible means of implementing parameterization tests.
Integration frameworks	Mid-term	While these can be started today based on some initial investigations, they will become laboratories for the development and test of cross-disciplinary relationships and will be needed for a number of years.
Analysis of evidence	Mid-term	This effort could be started now based on several existing approaches but would require several years to mature to the point where good tools could be developed and made operational.
Data model for structured, socio-cultural data	Long-term	Developing a data model without a good taxonomy and experience with filters and data sets would result in expensive rework.
Robust search engine to feed multiple post-processors	Long-term	Additional experience with the single-purpose search-and-process engines is needed to determine what can be mined, stored, and shared and in what format.
Multi-disciplinary model development	Long-term	Research is required to understand the relationships among the different disciplines before multi-disciplinary models can be used operationally.
Comprehensive computational socio-cultural models	Long-term	A focused research agenda is needed to spur the development of these capabilities.

Many of the S&T efforts can be leveraged with collaborating research sponsors. The temptation is to sponsor only short-term efforts; however, initiating mid-and long-term work with the right research partners is critical to providing needed operational capability.

B. UNITY OF EFFORT IN CIVILIAN-MILITARY ACTIONS

Unity of effort (UoE) is the coordination and cooperation that binds participants in complex efforts toward common objectives and results in more effective action and better outcomes. Achieving UoE within the U.S. Government in order to integrate the military instrument with other elements of national power has proven difficult enough. However, the challenge of UoE extends beyond U.S. interagency operations to include coalition partners, inter-governmental organizations (IGOs), non-governmental organizations (NGOs), private commercial interests, elements of a HNG, and centers of influence in the local population. Particularly in irregular warfare and counterinsurgency operations, unity of effort with the HNG and population is critical to successful stabilization and transition. This report identifies capabilities for improving UoE to help direct S&T investment.

For the U.S. military to enter a unified action and assume a lead role to direct actions of other participants would be counter-productive in most instances. The

appropriate role for the military, as leader or supporting actor, in any specific unified action will depend on the action's primary objectives and the nature of the operational environment. Similarly, the DoD must seek a balance between leading in the development of capabilities for UoE (where needed) and adopting the approach of other agencies that may already have accepted standards, methods, or technologies (wherever appropriate). Many capabilities identified here already exist, at least in some limited form, within the United Nations or international humanitarian and disaster response communities.

We developed a mental model of relationships across a network of organizations and provide a framework for understanding challenges in coordination and cooperation and the resulting implications for UoE. The model can be applied when building a network of participants for a specific unified effort, as a diagnostic tool and checklist to identify sources of problems in coordination and cooperation, or as a framework for case studies of past unified efforts to identify lessons that need to be learned. We then built on the mental model to develop and describe 3 essential functions of UoE for any mission and identify 16 needed capabilities:

- Essential Function #1: Identify Resources and Involve Key Participants
  1. Advertise and Recruit
  2. Map Organizational Networks
  3. Monitor Open Source Information
  4. Negotiate Collaboration
  5. Survey and Poll Participants
  6. Track Individuals and Groups

- Essential Function #2: Provide Means and Processes for Coordination
  7. Access Networks Remotely
  8. Automate Information Controls
  9. Provide Virtual Collaboration
  10. Publish and Notify
  11. Route Communications
  12. Shape Organizational Networks
  13. Verify Identity Remotely

- Essential Function #3: Monitor, Assess, and Aid in Cooperation
  14. Provide Compatible Messages to Population
  15. Measure Success of Collaboration
  16. Model the Organizational Network

  (also 5. Survey and Poll Participants, 6. Track Individuals and Groups, and 13. Verify Identity Remotely).

The results of this work could be taken in several directions, and the capabilities identified could be considered by a joint panel of practitioners of UoE and research partners to identify enabling technology initiatives. The capabilities and organizational network model could also be applied to real examples of civilian-military unified action as the basis for case studies to identify successes and shortfalls of UoE in recent operations. Finally, the work documented here could be further extended to a detailed treatment of each of the identified capabilities with an assessment of their relative priority.

C. COUNTERING CORRUPTION IN HOST NATION POLICE FORCES

Countering corruption in host nation (HN) police forces is a critical dimension of irregular warfare and is essential to establishing security and the rule of law fundamental to a stable society. However, a necessary condition that must exist to counter corruption in HN police forces is a legitimate HNG that is not corrupt and seeks to uphold laws. The type of corruption that is the focus of this work is dysfunctional police corruption in which the police undermine the rule of law and fail to provide security to the people. Elements of dysfunctional police corruption include social corruption (favoritism), police crime, and strategic partnering with organized crime.

We identified capabilities for countering corruption in HN police forces and identified directions for S&T initiatives that could help enable these capabilities. The approach taken for this work involved reviewing literature on police corruption as well as engaging with subject matter experts regarding current experiences in Iraq and Afghanistan. From this background, causes of and counters to police corruption were identified. The counters include approaches related to the individual officer, job-related improvements, changes in organizational structure, changes in oversight, and community involvement.

Capabilities for countering police corruption include vetting new recruits; training recruits to professional standards and values; offering professional development; increased pay; partner rotation; monitoring, investigation, and disciplinary actions; creating “tip lines” regarding police abuses; and forming neighborhood organizations analogous to “neighborhood watch” groups to work with the police.

The next step was to identify directions for S&T initiatives that would help enable these capabilities. The directions for S&T initiatives fell into one of three broad categories: social/psychological, organizational, and “hard” technologies. The S&T

directions that relate to social/psychological initiatives include giving objective metrics for selection of the police corps, providing aid in understanding social relationships of a culture, and improving the means for communication with the HN. The S&T initiatives that fall into the organizational category include initiatives aimed at improving leadership and reporting structure, providing the means for monitoring police activities, and identifying new challenges. The hard-technology initiatives include improving communications and decision making and providing a framework of documented accountability to help minimize corruption.

D. VEHICLE IDENTIFICATION AND TRACKING

We examined the potential value of vehicle identification and tracking (VI&T) capabilities in irregular warfare, discussed challenges associated with the development of such capabilities, and suggested directions for initiatives. Effective VI&T systems could significantly improve IW capabilities on several levels including:

1. *Active Cooperative Tracking*[3] *of* ***All Friendly Official Vehicles***. An extension of the current Blue Force Tracker (BFT) capabilities to include the automated, self-reported positions of vehicles of U.S. non-DoD agencies, coalition partners, host nation forces, IGOs, NGOs, and contractors could significantly increase coordination of activities, control of collateral casualties, and unity of effort. When employed by local security forces, it could improve their own security and responsiveness, and help deter corrupt activities. Existing cell-phone and Global Positioning System (GPS) technologies could provide the foundation for the VI&T system, which could augment, and perhaps be integrated into, BFT. A technical and operational challenge is maintaining operational security of the expanded system.
2. *Cooperative Tracking of* ***All Vehicles*** *in an Area of Interest*. Active cooperative tracking could be mandated for *all* vehicles in an area of interest. Non-reporting vehicles could be detected by other means [for example, portals, electro-optical/infrared (EO/IR) sensors] and detained. Alternatively, cooperative tracking could also be achieved by using passive (or semi-passive) coded transponders that are interrogated by ground and airborne sensors, which, in turn, transmit the identity and track of the target to a central

[3] In this report: a "target" is any vehicle being tracked, whether friendly or hostile; an "active" system means the target emits a signal that is received by the tracking system; a "semi-passive" system means the target emits a signal only when interrogated by the tracking system; and a "passive" system means that the target does not generate its own signal. In addition, "cooperative" targets are controlled by individuals who are not trying to defeat the tracking system whereas "uncooperative" targets are trying to defeat the system.

location for processing and distribution. VI&T of all vehicles would (a) enable the interdiction of uncooperative vehicles, (b) force Red to use a "registered" vehicle, which is identified and tracked, (c) facilitate forensic investigations by identifying all vehicles in an area (victims, suspects, witnesses) along with their track histories, and (d) facilitate precision targeting. This could greatly restrict Red's mobility and act as a strong deterrent to terrorist and criminal behavior. A "quick set-up" system coupled with controlled access techniques could be developed for limited areas with vehicles and occupants being identified on entry and vehicles tagged.

3. *Uncooperative Passive Tracking*. Uncooperative passive tracking could be enabled by covertly tagging specific vehicles and monitoring them using ground or airborne sensors. A number of technical approaches to covert tagging have been introduced and potential large-scale applications could be explored.

Most of the technologies required for the above capabilities are mature and affordable. Key needed initiatives include: (1) the integration of the new systems with existing command, control, communications, computers, and intelligence (C4I) systems; (2) the design of covert tags for large-scale operations against knowledgeable and wary enemies; (3) the management of the psychological and social aspects of balancing the desire for security with the desire for privacy in different cultures; (4) the anticipation of potential countermeasures to the VI&T systems and the methods with which to deal with them operationally and technically; and (5) the design of effective and affordable VI&T systems for transfer to host nation governments.

I. INTRODUCTION

In addition to "kinetic capabilities" (such as those focused on neutralizing enemy forces), IW[1] especially requires "non-kinetic capabilities" (such as those needed to support the security and well-being of the host nation population, the stability of the host nation government, and the coordination of military and civilian activities.) Recent experience makes it clear that the United States must improve its non-kinetic capabilities for IW in order to better meet the national security challenges of the 21st century. Such improvement will require initiatives across the full range of DOTMLPF+ categories.[2] In particular, a key question is "How should DoD's investments in science and technology be modified to better address the demands of IW?" This study explores several key dimensions of IW, identifies a number of critical non-kinetic capabilities associated with those dimensions, and suggests promising directions for S&T initiatives that could improve those capabilities.

A. STRUCTURE OF IW

Figure 1 illustrates the structure of IW. The clusters denote the various actors. "Blue" includes U.S. military and civilian organizations, coalition partners, IGOs, NGOs, and contractors. Likewise the other clusters denote factions within the population, HNG, and the opposing forces (Red)[3]. The clusters indicate the complexity of each group.

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1 IDA Paper 4267, "*Improving Capabilities for Irregular Warfare*, Volume I: *Framework and Applications* by W. Hurley, J. Resnick and A. Wahlman; and Volume II: *Capabilities Analysis* by A. Wahlman, August 2007. This reference provides a detailed discussion of the definitions of IW, its structure, and its many manifestations.

2 DOTMLPF+: Doctrine, Organization, Training, Material, Leadership & Education, Personnel, Facilities plus other areas such as planning, policy, interagency and multinational coordination, and experimentation.

3 The authors acknowledge that the terms "Red" and "Blue" are taken from the traditional language of regular warfare and kinetic operations whereas distinguishing the actors in IW can be much more subtle. Nevertheless, we use this convenient shorthand with the understanding that "Red" and "Blue" refer broadly to adversaries and friendly actors, respectively.

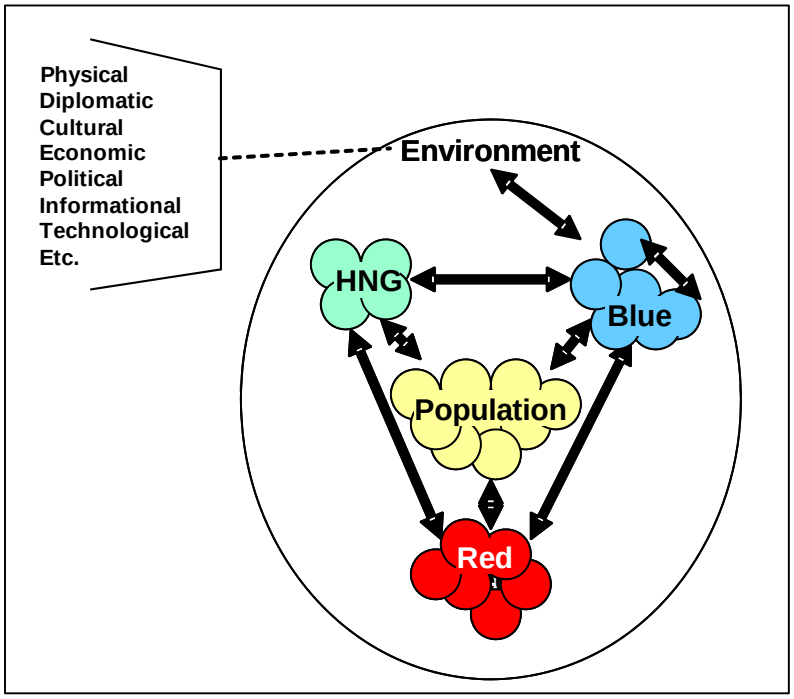

Figure 1. Structure of IW

Equally important, but not illustrated here, is the dynamic nature of IW. Factions within one group may change in time. For example, a faction within an insurgency group (Red) may separate from the others and become neutral (move to the "population") or even join Blue.

Figure 1 also lists various dimensions of the complex environment in which IW takes place.

B. IW CAPABILITIES

The two-way arrows in Figure 1 represent interactions between actors and, therefore, also the types of capabilities that various actors must have. In particular, a U.S. Joint Force Commander (JFC) (military or civilian) must effectively engage with five types of actors within the IW structure: Red, the population, the host nation government, the various dimensions of the environment, and other members of Blue. Each actor presents its own challenges but we may generally classify the needed capabilities into

three interrelated classes: understand, shape, and engage.[4] "Understand" focuses on gaining and interpreting information and involves a range of capabilities from cultural understanding to tactical intelligence to sensors and processing. "Shape" focuses on abilities to turn understanding into effects that are to Blue's advantage. Examples include capabilities to influence a local population or train indigenous security forces. "Engage" capabilities are typically taken to be kinetic capabilities employed against Red, but in IW may also include, for example, capabilities to communicate with a local population.

Of course, this categorization scheme for capabilities involves a number of "gray areas" and ambiguities. Its main benefit is not so much a rigid classification of capabilities but rather a checklist for reviewing operational needs and the types of capabilities that could address them. Figure 2 illustrates the resulting organizing construct.

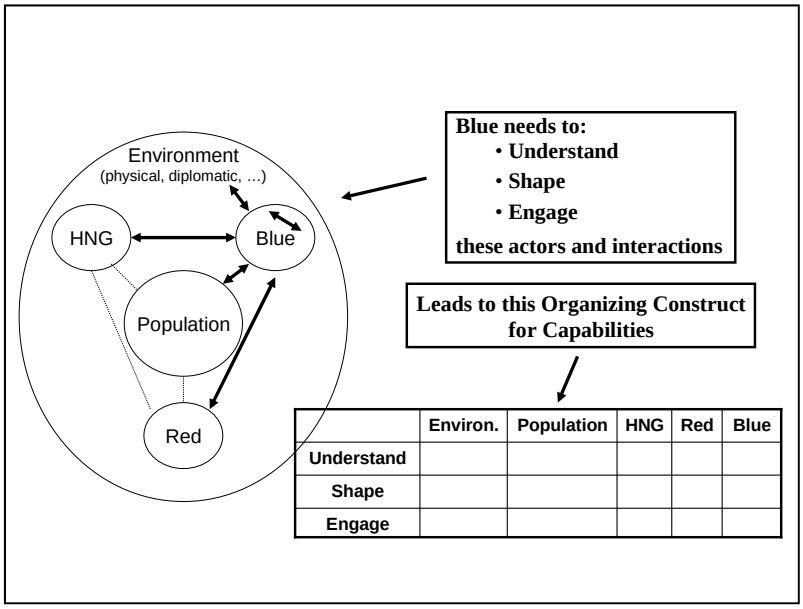

Figure 2. Organizing Construct for IW Capabilities

C. NON-KINETIC CAPABILITIES

For the purposes of this study, we take "kinetic" capabilities to be those focused on physical force and systems that immediately support the use of physical force (such as

[4] The "understand–shape–engage" scheme originated with JP 3-06 [Joint Doctrine for Urban Operations (September 2002)] as a construct for classifying capabilities for urban operations.

vehicles or target acquisition sensors). By "non-kinetic" capabilities, we mean all other IW capabilities.[5] In terms of the structure of IW capabilities described above, almost all kinetic capabilities are associated with the arrow connecting Blue and Red. With a few exceptions, all other Blue IW capabilities associated with Blue's interactions with the population, HNG, environment, and Blue itself are non-kinetic. In short, most IW-specific capabilities are non-kinetic in nature.

D. DISTINGUISHING ATTRIBUTES OF IW VS. REGULAR WARFARE (RW)

The above framework provides a structure for the landscape of IW capabilities, but the landscape is vast. Where should initiatives be focused? Insight into the answer to this question may be gained by identifying IW capabilities that differ markedly from RW capabilities and so are likely to have been neglected as the United States focused on RW challenges. The previously cited IW study[6] contains a detailed review of IW missions and capabilities and identifies five attributes of IW that distinguish it from RW:

1. Centrality of Human Terrain

> *Whatever else is done, the focus must remain on gaining and maintaining the **support of the population**. With their support, victory is assured; without it, COIN efforts cannot succeed.*
>
> (Counterinsurgency, FM 3-24/MCWP 3-33.5, Dec 2006, p. A-9)

The population is the **"center of gravity"** of IW: (1) militarily, to find, identify, and isolate Red; (2) politically, to establish the legitimacy of the host nation government; and (3) economically, to reconstitute national resources and civilian services. The support of the population is driven by its attitudes regarding the opposing sides which, in turn, are driven by each individual's sense of security and social/economic/political well-being, and by messages being communicated by the host nation government, Blue, Red,

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[5] This differs from a definition of kinetic and non-kinetic means recently suggested by the Deputy's Advisory Working Group (DAWG), which defines "Kinetic Means" as "the ability to create effects that rely on explosives or physical momentum (i.e., of, or relating to, or produced by motion)" and "Non-Kinetic Means" as "the ability to create effects that do not rely on explosives or physical momentum (e.g., directed energy, computer viruses/hacking, chemical, and biological)." Whereas the DAWG definition is Red-centric (characterizing "non-kinetic means" under "Force Application–Engagement"), the definition we use applies to IW as a whole and stresses the importance of the other actors in IW (population, host nation government, environment, Blue) in addition to Red.

[6] See Footnote 1.

and a host of opinion-makers including local leaders, social networks, media, rumors, traditions, and narratives.

The fundamental capabilities needed are to **understand and shape the attitudes of the population.** Critical focus areas include: influence operations, cultural training, human intelligence, opinion polling, and media effectiveness.

2. Intricate Mixture of Civilian and Military Organizations and Activities

> *The integration of civilian and military efforts is crucial to successful COIN operations.*
>
> (Counterinsurgency, FM 3-24/MCWP 3-33.5, Dec 2006, p. 2-1)

Civilian organizations include U.S. non-DoD agencies, coalition partners, IGOs, host nation partners, NGOs, and contractors. IW tasks range from purely military to purely civilian with a broad gray area in between in which the mix of military and civilian resources employed will depend on the task and the circumstances.

The fundamental capability is to achieve **unity of effort** among the civilian and military organizations at the local, national, and international levels, and from (even before) the beginning of the contingency. Critical focus areas include: multi-organizational and multi-level communication systems to connect the Blue partners without compromising restricted information; multi-sided planning processes; and organizational approaches to accommodating disparate organizational cultures.

3. Nature of IW Combat Actions

Combat actions within an IW environment differ significantly from combat actions within an RW environment:

- IW emphasizes ground-centric actions embedded within a population. Key capabilities include the isolation of Red from the population and engagement with measured effects to reduce collateral casualties and damage.
- In IW, Blue and Red share a common environment and have mutual access. Key capabilities include defending against close-up attacks (IEDs, snipers) and shaping Red's operating environment by restricting movement, monitoring communications, and interrupting supplies.
- IW environments tend to be urban (people, structures, and infrastructure). Key capabilities include the support of small units conducting distributed

operations in complex terrain, and the preparation of junior leaders for heightened responsibilities.

4. Consolidation

Once a level of security is achieved in an area, IW emphasizes maintaining that security and stability while conducting reconstruction activities. Key capabilities include holding areas that have been cleared; partnering with host nation, coalition, IGOs, and NGOs; and being civil-support "first-responders" when non-DoD organizations are not available for such functions as humanitarian assistance, governance, police and reconstruction.

5. Transition

The overarching objective of IW is to transition responsibility and authority for security, social well-being, and reconstruction to the HNG. Key capabilities include planning with interagency, HNG, IGOs, NGOs, and contractors; leveraging local capabilities (partnering with, hiring, supporting); training and advising host nation security and civilian personnel; and equipping host nation security and civilian personnel with systems that are consistent with host nation resources (costs, operator skills, operational environment).

E. FOCUS AREAS FOR INITIATIVES

The above framework of "distinguishing attributes" and types of capabilities can be applied in several ways including (1) to help identify IW focus areas that are in need of improvement, (2) to help identify the range of potential IW applications of a given program or initiative, and (3) to help determine how well a given portfolio of programs covers the needs of IW.

The following chapters address four examples of non-kinetic focus areas that are motivated by the distinguishing characteristics of IW just discussed: influencing the population (human terrain); achieving unity of effort in civilian-military actions; countering corruption in host nation police forces (consolidation and transition); and identifying and tracking vehicles (multiple IW applications). Each focus area is essentially a cluster of related capabilities. In the first three cases, the structure of the focus area is explored, and a number of capabilities and potential directions for S&T

initiatives are identified. In the last case, the utility of the capability to identify and track vehicles is examined for a broad range of IW challenges. In effect, this report describes the results of "scouting expeditions" in these areas to identify promising directions to pursue. It does not present a complete description of the focus area or detailed specifications of S&T initiatives. Rather, it discusses the "lay of the land" and likely promising directions for further exploration and development.

F. "SCIENCE AND TECHNOLOGY" INITIATIVES—NOT JUST ABOUT GADGETS

We stress at the outset that, as used here, S&T initiatives are not exclusively focused on "hard" technology. This is a challenging viewpoint to take in light of the long tradition of DoD S&T development to focus almost exclusively on improved weapons, sensors, and vehicles, i.e., "kinetic" capabilities. But IW is fundamentally about "human terrain" and "attitude space," and DoD is beginning to broaden its S&T domain. Hard technologies play important roles, but improvements in our understanding and application of the psychological and social sciences are central to many key challenges of IW. Therefore we take the term "S&T initiative" to include both traditional efforts to improve kinetic capabilities *and* initiatives to improve our fundamental understanding of human behavior and apply it to the challenges of IW.

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II. INFLUENCING THE POPULATION

Summary

The capabilities and associated S&T thrusts explored in this chapter are based on the premise that the ability to work with the local population and the HNG is critical to success in many aspects of irregular warfare. This is particularly important for countering insurgencies and building a foundation for long-term stability. The fundamental thesis is that the US should not be seeking to win the hearts and minds of the people, but rather should work to help the HNG develop the capacity to provide for the security and basic needs of the whole population and thereby to help the HNG win the hearts and minds of its own people. To achieve that goal, it is necessary for the US to understand the various segments of the population and their needs. It is also necessary to assess the capability of the HNG to address those needs. Clear understanding is often hampered by tacit assumptions; thus, frameworks that expose assumptions and aid users in enumerating factors that influence both the population and the HNG must be developed. Finally, as the expertise and information needed to provide context and inform models is distributed, the US must develop networks of expertise and the infrastructure to support them. Thus, the following four capabilities cited:

- Improved methodologies for assessing the population's attitudes
- Data to objectively assess public services provided by the HNG
- Models and tools for influencing the population's attitudes and actions
- Forward headquarters and units with reach-back to these methodologies, data models, and tools

are directed toward creating a clear understanding of the population and capabilities of the HNG and putting that understanding at the service of military decision-makers.

Science and technology have much to contribute in support of these capabilities. The specific thrusts examined in this document represent a focused subset, not a comprehensive list. The focus is on the S&T efforts that

- Provide the infrastructure for storing, managing, manipulating, and sharing data and information
- Enable the rapid acquisition of multi-source, multi-lingual information

- Assist in the collection and integration of structured data from multiple, diverse sources
- Develop the means for semi-automation of the human-intensive process of reducing unstructured media information into machine-usable structured data
- Support the formation of federated, information-sharing capabilities within DoD and externally with other agencies, coalition partners, and any who can contribute expertise in support of the capabilities.

While pointed along common vectors, the S&T thrusts are multi-disciplinary, ranging from social science to computer science, and include every category from basic research to prototypes involving existing technology. As a move toward implementation, Table 1 categorizes the S&T thrusts as short-, mid- and long-term efforts. Short-term efforts could be begun now and produce results in 12-18 months. Mid-term efforts require more time to mature. Long-term efforts either require considerable basic research or involve socialization across a diverse community before they can be implemented.

Many of the S&T efforts can be leveraged with collaborating research sponsors. The temptation is to sponsor only short-term efforts; however, initiating mid-and long-term work with the right research partners is critical to providing needed operational capability.

Table 1. Science and Technology Thrusts

S&T Thrust	Term	Comments
Development of a prototype, common, socio-cultural taxonomy	Short-term	Several RRTO programs have produced a good start, but coordination is required among the several groups bent on independent development efforts.
Better language translation capability	Short-term	Much work has already been done, but more key languages must be addressed.
Exploitation of statistical linguistic analysis	Short-term	This field is ripe for maturation, and we need to understand how far and fast it can be pushed.
Development of data coding expertise	Short-term	While the need for new coding expertise will grow as our appetite for new data increases, training in data coding can begin now starting on the work done for terrorism.
Collaborative relations with a major polling company	Short-term	Establishing a research “seat” with a polling company could open this type of information to the research community whose results can inform operational use.
Improved methods for eliciting expert knowledge	Short-term	Compilation of best practices from the research community in combination with techniques used by the military and intelligence communities could be started.
Operational use of high-quality statistical models	Short-term	Incorporation of some of these models into a toolkit with instructions for use and built-in evaluation tools can be started now.
Immersive, interactive training capabilities	Short-term	Much of the technology already exists, but its employment requires careful definition of what needs to be absorbed by the student and how that will be tested.

Table 1. (continued)

S&T Thrust	Term	Comments
Prototype Federation with automated rules for secure information interchange	Mid-term	The technology is ready, but the formation of the Federation requires some socialization and development of acceptable security exchange agreements.
Development of a comprehensive, mature socio-cultural ontology	Mid-term	The initial prototype will expose undefined concepts and relationships and push the operational community to determine what data re required at different echelons and for different missions.
Collection of structured data: specify key structured data sets and develop filters	Mid-term	Many of the data sets are known. Filters require a defined taxonomy and data format for the destination data before they can be written.
Game theoretic analyses	Mid-term	New models capable of multi-sided gaming are now being developed but must undergo careful testing before being accredited for operational use.
Operational employment of agent-based models	Mid-term	Most models require development of an analytic framework around them with some relatively accessible means of implementing parameterization tests.
Integration frameworks	Mid-term	While these can be started today based on some initial investigations, they will become laboratories for the development and test of cross-disciplinary relationships and will be needed for a number of years.
Analysis of evidence	Mid-term	This effort could be started now based on several existing approaches but would require several years to mature to the point where good tools could be developed and made operational.
Data model for structured, socio-cultural data	Long-term	Developing a data model without a good taxonomy and experience with filters and data sets would result in expensive rework.
Robust search engine to feed multiple post-processors	Long-term	Additional experience with the single-purpose search-and-process engines is needed to determine what can be mined, stored, and shared and in what format.
Multi-disciplinary model development	Long-term	Research is required to understand the relationships among the different disciplines before multi-disciplinary models can be used operationally.
Comprehensive computational socio-cultural models	Long-term	A focused research agenda is needed to spur the development of these capabilities.

A. INTRODUCTION

This chapter focuses on the HN population, which is the center of gravity in IW. Defeating insurgent forces, to ensure security for the people, depends on the active support of the population. Gaining legitimacy of the coalition military presence depends on its acceptance by the HN people as a result of the security it provides. Achieving long-term stability of the host country depends upon a capable government recognized as legitimate by the population.

The phrase "capturing the hearts and minds of the people," has been used frequently in describing the work of irregular warfare, counter insurgency, and stability

operations. The thesis of this chapter is that the work of the United States is to aid the HNG in winning the confidence and support of its own people. The influence of the United States must be exercised in the following areas: understanding the needs of the whole, complex population; working with the HNG in providing for the security and basic needs of the whole population; and assisting the people in understanding and working with their government. Influence in the context of this chapter rests on a clear understanding of people and the HNG as the essential first step in exercising all forms of influence to convince the population and the government to work effectively together toward a safe and stable future.

This chapter is about influencing the population. There can be different objectives for influencing the population: influencing attitudes (for or against) or influencing actions (to act or not to act). The ability to influence the attitudes and actions of the various parts of the population is critical to achieving an outcome that meets the goals of the people, the HNG, and the coalition.

This chapter is about the *art* of influencing the population. Influence can come in many ways. It can come about through actions: coalition or insurgent, kinetic or non-kinetic, intended or accidental. It can come through communications: personal (one-on-one or group) or mediated (TV, radio, Internet, or newspaper). It can come through the promise and/or use of carrots or sticks. How best to use the various forms of influence is not a science. Like military operations in general it remains an art—but an art that can be informed by the social sciences.

The capabilities and S&T initiatives identified in this report draw heavily on the social sciences. They are intended to provide understanding and tools that can influence the population in ways that maintain respect for the HN population in all its diversity and recognize their differences from us. This means understanding how routine U.S. military actions can have what appear to us to be non-logical negative influences on people; how communications from senior American leaders can have paradoxically (to us) negative effects; how less direct means can sometimes have more positive effects.

Section B of this chapter, The Art of Influencing, describes why influencing the population is so complex an undertaking, how this kind of influence can occur, and how unintended effects can overwhelm intended effects.

Section C, Capabilities Needed for Influencing the Population, describes four capabilities important to understanding and influencing the population. They are the

basis for understanding the HN population's attitudes and the HNG's delivery of public services; they provide the models and tools needed for influencing the population's attitudes and actions; and they provide the basis for sharing this information and other expertise available through reach-back.

Section D, Technologies to Support Capability Initiatives, describes six S&T initiatives that would provide data, models, and tools for influencing the population.

Section E, Conclusions, describes the next steps that need to be taken to advance the art of influencing the population.

B. THE ART OF INFLUENCING

This section describes why influencing the population is so complex an undertaking, how this kind of influence can occur, and how unintended effects can overwhelm intended effects.

1. The Complexity of the Situation

In *regular* warfare the tendency is to see various actors in a theater of engagement as either Red (adversary), Blue (friendly forces) or Green (indigenous population). While convenient, this simplification is wrong and dangerous in irregular warfare.

The complexity of the situation is hinted at in Figure 3, which depicts the major groups involved in IW. Both Red and Blue are shown as collections of smaller groups to emphasize the complexity that has been suppressed by the use of the simple terms, Red and Blue. The indigenous population has been divided into the Population and the HNG. Both are also shown as a collection of groups. The term "environment" refers to the fact that all of these groups function within physical, diplomatic, political, military, and economic situations often beyond their individual control. Their actions are motivated by individual and organizational cultures. Each group exists in its own information environment, which contributes to how it sees itself, particularly in relation to each other and the rest of the world. Each group is enabled by its access to technology and the associated capabilities. Each of the four major groups shown exists in a complex environment enriched (or further complicated) by webs of formal and informal regional, international, and transnational relationships and influences. And each is trying to influence the other.

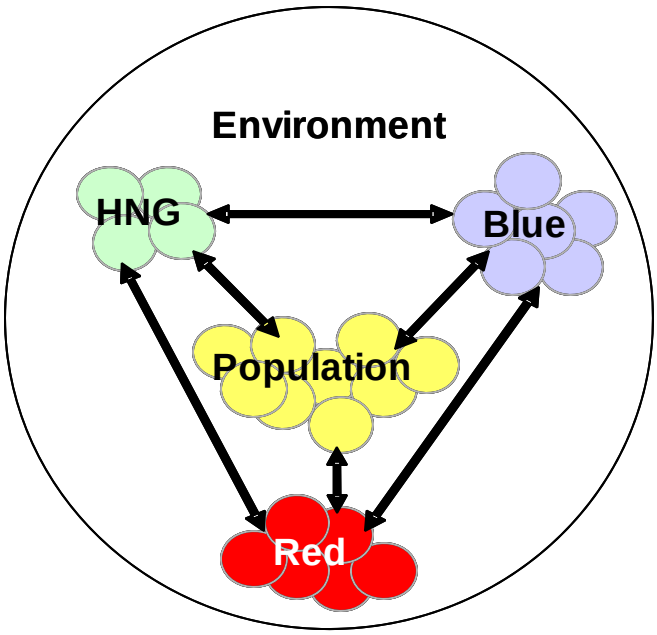

Figure 3. Groups in Play in Irregular Warfare

The HNG's actions are influenced by other nations, transnational groups, international organizations, and sub-national factions. Some relations are overt and formal, manifested in diplomatic agreements, trade agreements, international economic partnerships, and shared ideologies. Some are based on family ties and informal cultural or economic relationships that are difficult to discern because they do not correspond to the more formal government-to-government model. Within any national government, factions are likely to represent various points of view and interest groups. These groups could be influenced by ideologies or ties to ethnic groups that span several nations—transnational influences. Understanding these complexities before entering into relationships with the HNG is essential to achieving the desired effects in a military engagement or in establishing long-term, tenable diplomatic relationships.

Populations are routinely divided across economic strata, social groups, religious denominations, ethnic or cultural groups, and groups that ascribe to specific ideologies, religious or political—the "right," the "left," the "religious right," etc. Where family ties are strong and where the extended family group exercises significant influence on the actions and decisions of the individual,[1] recognizing and dealing with affinity groups is

[1] In many societies, the local government may cede the rule of law to the leader of an affinity group (family, religious, or tribal). The individual may see himself as a member of a collective and that collective makes the decisions and inculcates the viewpoint of the entire local group.

even more important. Until the major factions of the society can be identified together with their motivations, interests, trust networks, and modes of interaction, the task of shaping, influencing, and working successfully with the population cannot begin in earnest.

Red can be a loosely knit coalition of groups with many groups competing for leadership or with one or two primary groups taking the lead. Their modes of interactions, networks of communications, and command and control structures are often not visible, nor are they readily subject to control by Blue. The complexity that exists in the Red structure has to be uncovered and dealt with by Blue.

Among the groups that can be seen as part of Blue, yet have independence of action, are non-governmental groups, for example, the Red Cross, Red Crescent, and Doctors without Borders. By their presence and the services they render, they influence how the local population thinks and acts. As countries develop and professional groups emerge, these groups are likely to affiliate themselves with similar international communities—trade associations, international commercial associations, and international scientific societies. Such international groups can influence their associates in the nation in question and their dialog could help Blue to influence the population indirectly, particularly if there is a growing professional class in the nation that seeks international recognition.

2. Exercising Influence

Influence comes in many guises. It can be exercised directly or indirectly, through the use of incentives and disincentives or through a wide range of mass communications media ranging from popular speakers to media reports. The most important form of influence, and the one often ignored by many Blue planners, is the day-to-day action of Blue and their agents (contractors and others seen as being part of the Blue presence).

Not recognizing the complexity of the population is the major pitfall to the success of attempts to influence. The population is a complex mix of groups with different attitudes and motivations. Incentives or disincentives that work for one group may leave other groups unmoved. What appeals to one segment of the population may cause another group to embrace the behavior that Blue intends to counter. The actions and communications of Blue must be weighed and balanced to accommodate the major factions within the indigenous population. For this reason, a model or framework is

needed that directs Blue to acquire information about various groups within the population and to experiment with different sets of approaches as the foundation for prudent courses of action and communications.

a. Direct Communications

Direct communications could involve carrots, sticks, or appeals to logic and values.

- *Rewards* could be offered for specific actions taken by the population. For example, Blue could offer monetary rewards for reports on the presence of insurgents that result in apprehension of insurgents or their material resources. In other situations, benefits might include the presence of more security forces for neighborhoods that set up their own neighborhood watch programs or more electricity each day for neighborhoods that help prevent attacks on the electrical network.
- *Punishment* could be threatened to prevent undesired behavior. Penalties imposed for looting is an example of a disincentive. The best use of penalties is to design disincentives that enforce the notion of the rule of law. A government's development of rule of law based on punishment for undesired behavior and of a legal/judicial system that metes out punishment can be a positive consequence of using penalties or disincentives.
- *Appeals to logic or deeply ingrained values* can be used to influence the population. From "it makes no sense to" logic to "these actions do not represent the best example of" arguments, appeals to values may help a population reevaluate its own activities and their consequences. Communicating such messages is better done by a spokesperson who is not part of Blue, but a leader within the population itself. Locating and cultivating the local leadership can foster appeals to the population based on the culture's own values and beliefs. And members of local leadership will have credibility not accessible to a member of a foreign culture.

b. Indirect Communications

Indirect communications with the population can be done through mass media—television, radio, newspapers, other printed media, and Internet. One issue is the degree of penetration of the various forms of communication into significant elements of the society. Printed news media may reach the elite, but not the general population. Internet is effective only in areas where significant segments of the population have access to computers or Internet cafes. Understanding which groups are reached by the media enables tailoring of the message for the targeted population. Each segment of society has

trusted channels of communication. Some may rely on printed media, some on radio, others will seek out the Internet, but most will ultimately trust individuals who hold their respect by virtue of their position within the community. These could be family or tribal leaders, religious leaders, or recognized leaders of groups within or outside the society. Success using communications to influence the population depends on learning which channels of communication to use and how to use them.[2]

c. The Voice of Actions

Actions can be the single most effective means of influencing the population. Actions that enforce penalties or deliver rewards can be powerful indicators of the respect or lack thereof that Blue has for the local government and the population. Working with the local government in enforcing behavior among the population not only shows respect for the local authority but empowers it for the long term. On a daily basis, the way individuals from Blue interact with the population influences the population—for good or ill. Failure to show respect according to local custom can create long-term problems for any occupying or peace-keeping force. On the other hand, when Blue uses the existing social relationships and empowers the people and their government, they lay the groundwork for a stable future.

3. Reactions of the People

Reactions of the people to efforts of Blue to exert influence on them through communications (direct or indirect) or actions are shaped by a number of factors. The population experiences the range of actions taken against them—kinetic and non-kinetic. The death and destruction that touches their lives and the lives of family and friends preconditions their receptivity to any follow-on actions by Blue and Red. These experiences feed their individual and collective memories. They are weighed in relation to their desires, aspirations as a society, and current wants and needs. These reactions combine with their traditional outlook as they take in the messages delivered to them in the actions and communications of Blue and all of the other groups that interact with them and seek to influence them.

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[2] Most societies have connections with outside groups—diplomatic relationships, trade partners in the region, professional organizations, or other international or transnational groups.

C. CAPABILITIES NEEDED FOR INFLUENCING THE POPULATION

Working successfully with—and in the midst of—the host nation population is the key to success in irregular warfare. In many cases, unrest is due to the HNG's inability to provide for the security and the basic needs of all segments of the population. So, understanding both the attitudes of the population and the performance of the HNG are key capabilities in influencing the population and setting the host nation on the road to long-term recovery and stability. In addition to a lack of basic information needed to build this understanding, the U.S. also lacks explicit models and tools for influencing the population. Explicit models are particularly important. The development of these models requires that we expose the hidden assumptions in our mental models. Hidden assumptions inhibit clarity of thought and communication. They also blur distinctions and erase the subtleties that are an essential part of the true understanding of the population. And, there is no infrastructure in place to enable the appropriate sharing of the information we do have. This study has focused on the four capabilities described in Table 2 and discussed in the next sections.

Table 2. Capabilities Needed for Influencing the Population

1. **Improved methodologies for assessing the population's attitudes**
   - *Importance:* Assessing attitudes toward diverse issues, HNG, Blue, internal elites/leaders, and media is pre-requisite to understanding them, meeting their needs, and influencing them
   - *Needed:* Dramatically improved capability to probe the range of current attitudes and long-term values of the population using a wide variety of methods especially in the local vernacular

2. **Data to objectively assess public services HNG provides**
   - *Importance:* Extent of HNG delivery of services is a major influence on population's attitudes
   - *Needed:* Current, factual data on what public services are actually being delivered

3. **Models + tools for influencing population's attitudes + actions**
   - *Importance:* Well-structured, formal models provide ability to use evidence consistently and test different modes of interacting with the HNG, population and Red
   - *Needed:* Consistent data and modeling frameworks firmly based on good social science theory and practice

4. **Forward HQ and units with reach-back to these methodologies, data, models, and tools**
   - *Importance:* Different degrees of expertise needed at different levels of command to guide actions and communications, and some is available only by reach-back to CONUS
   - *Needed:* A knowledge framework and information infrastructure that enables sharing of information currently held in diverse locations and compartments

1. Capability 1: Improved Methodologies to Assess the Population's Attitudes

Assessing the attitudes and opinions of the various segments of the population is as vital before entering into conflict as during the transition from conflict to

reconstruction and stability. The task sounds straightforward, but the practice is difficult. There are a number of ways to probe for attitudes and opinions [1] including content analysis, solicitation of expert opinion, statistical analysis of data, and surveying or polling. All are subject to error and misinterpretations due to cultural and linguistic differences, translation errors, and biases on the part of the speaker and/or the listener. These are discussed below and summarized in Table 3.

Table 3. Summary of Capability 1

Summary Capability 1: Improved Methodologies To Assess the Population's Attitudes
1. Content Analysis – *Challenge:* Labor intensive, difficult to generalize to local vernaculars – *Initiative:* Enable survey of local media in more of the key local languages
2. Expert Opinion – *Challenge:* Getting wisdom from experts with political agendas, bias, or stake in outcome – *Initiative:* Work with business and academe to advance art of eliciting expert opinion on controversial issues
3. Statistical analysis about security, standard of living, economic development – *Challenge:* Identifying indicators of larger issues, using data from diverse sources – *Initiative:* Enable use of standard data from reputable sources and collection of local data
4. Survey/polling data in failed/fragile states assessing public views – *Challenge:* In failed/fragile states getting representative samples, wording questions, training conductors – *Initiative:* Advance "polling science" in failed/fragile states for use by deployed forces
5. Integration of information from all the methodologies – *Challenge:* Integrating the results from the several methodologies remains an art – *Initiative:* Work with business and academe to advance the art of integrating diverse analyses

a. Cultural and Linguistic Sources of Error

Misinterpretation as a result of cultural differences is significant in irregular warfare. Our deepest values are culturally based, and how we express them is dependent on linguistic roots. Thus, awareness of both language and culture and how they color the nature of discourse, both orally and in writing, is important. One approach the business world takes to characterize countries and regions uses criteria developed by Geert Hofstede [2].

- The Power Distance Index (PDI) reflects the extent to which the least powerful in a society expect and accept that power will be distributed unequally. If the index is high, the society is amenable to strong rule from a few.

- The Individualism Index (IDV) reflects the extent to which the individual is integrated and dependent on the group. A low value indicates that, from birth, the individual is closely integrated into strong, cohesive groups, often extended families, from which they expect and are given a level of protection in response to their loyalty.
- The Masculinity Index (MAS) reflects the extent to which the expectations of men and women are different.
- The Uncertainty Avoidance Index (UAI) reflects the degree to which a society is tolerant of ambiguity and uncertainty. Where uncertainty avoidance is high, there is a tendency for strict laws, security measures, and a level of belief in the absolute.
- Another index, Long Term Orientation (LTO) reflects the degree to which a society embraces long-term commitments and tradition. But as it is not uniformly applied, comparisons using it are not always possible.

Figure 4 shows these indexes for the World Average, the Arab World, Latin America and the United States. The only index that is not drastically different between the United States and either the Arab World or Latin America is the Masculinity Index.

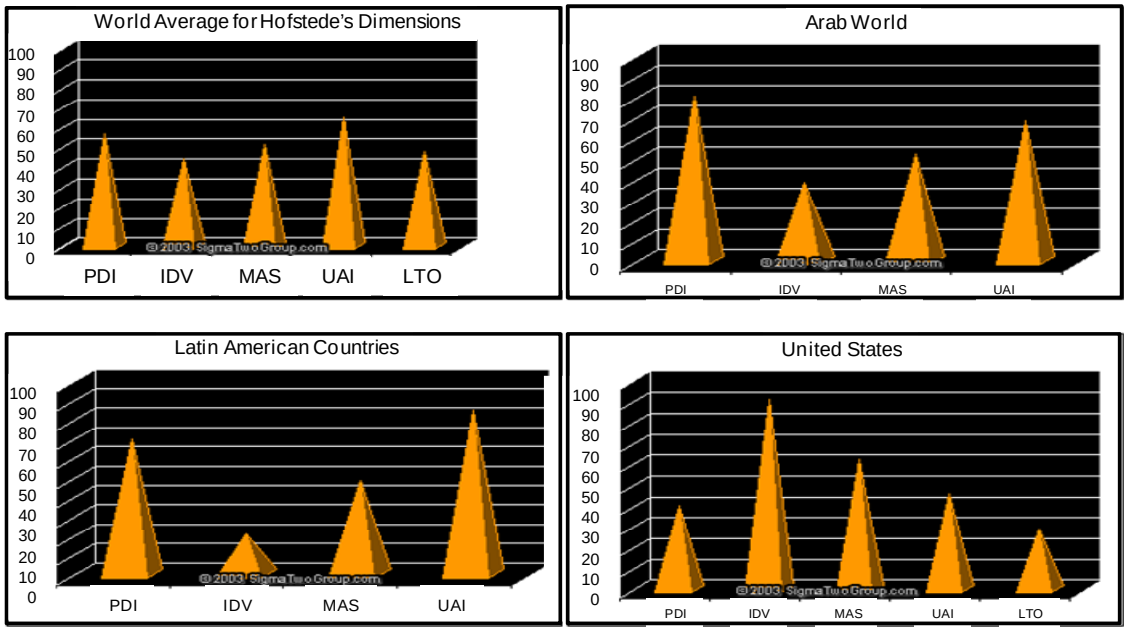

Figure 4. Regional Comparison of Hofstede's Cultural Dimensions

The U.S. listener is individualistic, egalitarian, and highly tolerant of ambiguity—making him self-assertive, ready to judge for himself, and comfortable with new or changing situations. It is difficult for such a listener to understand and interpret correctly

one who is accepting of authority, conforms to the ethos of groups, and prefers to be in familiar situations—an orientation characteristic of both the Arab nations and Latin America. In discourse, the U.S. speaker is prone to be direct and to the point, while for the Arab (and Persian), speech is rooted in poetic expression and epic ideas and not to be taken lightly or rushed. "Mirroring," failing to take such differences into account, and judging others from one's own cultural foundations leads to significant and potentially dangerous misinterpretations.

Linguistic difference is the second major problem in gathering and understanding attitudes and opinions. Most Americans lack multi-lingual capability and must rely on translations. Not all media is in English and the selection of what will be translated creates a filter on the opinions that ultimately reach the English-speaking audience. Opinions translated are likely those of the elite, and, when the government controls the media, the opinions will be those of the government. Meaning is often lost when text is translated. This can be caused by shortcomings on the part of the translator or lack of equivalent concepts in the destination language. To gain access to the opinions of the population, it is necessary to probe in the vernacular using the communication channels trusted by those whose opinions are sought. Many segments of the population do not have routine access to the Internet or to printed media; however, they may rely on radio broadcasts for their news. Their opinions may be based on the word of others in their community whom they respect and who have greater access to a broader range of media reports.

b. Ways to Probe for Attitudes and Opinions

Content Analysis is the ability to mine and analyze media in an automated fashion. Two primary components of this capability include a good search engine and some type of natural language processing that enables the extraction of ideas and opinions.

- When humans mine information, they often "pull a thread," that is, they find a useful reference and probe its sources to find new sources and so on to amass a volume of information about a topic. In this process, the individual searches through multiple layers and paths of web holdings.
- Machines work differently, capitalizing on breadth rather than depth. Starting an automated search with source sites as well as the words or phrases that constitute the search parameters produces a far better cache of documents.

One technical approach to extracting is called a “bag of words” method. Here the computer searches the document for words or phrases listed in a thesaurus developed for a specific topic. In addition to marking the references containing the sought words, the computer may produce a prioritized list of references by cataloging the number of times specific words or phrases are found in the document.

A second approach exploits advances in natural language processing. These methods use syntactic relationships, proximity relationships, and tone (positive or negative) to extract concepts. Post-processing algorithms applied to these extraction processes can catalog and track changes in concept or tone over time from specific sources. Algorithms based on structure and word usage can often be used to define and track a specific speaker.

Techniques developed for English do not often translate well into other languages, e.g., the use of structure and phraseology. The simple “bag of words” approach, with its somewhat more limited post-processing options, is by far the easier approach to migrate across multiple languages. However, even with the “bag of words” approach, considerable linguistic ability is required to take a thesaurus and provide a translation that captures concepts in another language.

Elicitation of Expert Opinion uses subject matter experts to examine and report on issues. All experts are influenced by their culture and the training or experiences that made them subject matter experts. Thus, by virtue of culture, training, and experience they possess both knowledge and biases. If the experts come from U.S. culture, they will understand the U.S. question immediately, but they may misinterpret the situations they are observing in a foreign culture—especially if they are not fluent in the language and unable to capture nuances in speech or action. If the experts are from the foreign culture, they may have biases or agendas that we do not understand and cannot interpret. Ideally, the expert should be knowledgeable about the topic and the culture in which observations are to be made. By working with the expert team over an extended period of time, the United States can begin to understand and thus minimize the effects of these biases.

Statistical Analysis is a more objective tool for assessing the situation in a country. However, a country experiencing some form of disruption or insurgency is not likely to have an infrastructure or bureau of statistics capable of cataloging accurately all the information needed. Many developing nations publish national statistics of questionable quality and virtually nothing at the local or provincial levels. Most of the

statistics refer to demographic information and not to opinions and attitudes—and what exists may have been doctored to produce politically acceptable results.

Surveys or Polling data can provide a good basis for discerning the attitudes and opinions of the population. Responses to well-structured survey questions accompanied by accurate demographic information can delineate divisions in the populations, a factor important to those attempting to effect change in that environment.

Surveys and polls must be carefully constructed and proven methods used to determine the nature of a valid sample of the population. The latter is difficult to do without a good understanding of the major divisions of the society—political, ethnic, and economic. Developing the survey instrument and set of questions to be answered is not a casual exercise but uses methods and techniques developed, documented, and taught in academic institutions. Translating a survey into another language, where not only the words but also the concepts and manner of discourse are different, is even more difficult.

Administering a survey in another culture requires knowledge of local language and customs. In most cases, the survey should be administered by a native of that culture. During a period of conflict, however, even members of the same culture may have difficulty getting reliable responses. The process of administering the survey and even securing the location where it is administered is an issue during conflict.

Integrating Information from Different Methodologies is important to gaining a relatively complete and coherent picture of the population and its desires. At present this is done in the mind of the user based on his or her private mental models. Some means of objectively integrating the evidence is needed so that decisions can be made on a more reliable and transparent basis.

2. Capability 2: Data to Objectively Assess Public Services the Host Nation Government Provides

The role of any HNG is to provide for the security and basic needs of all of its peoples. To the extent that the HNG succeeds, it shows itself to be a viable and functionally legitimate entity. The presence of an insurgency or other significant forms of public violence are often signs that the HNG is failing to provide for the security and basic needs of at least some segments of the population.

At the strategic level, Blue faces a decision: either support the existing government by helping it to improve its ability to function or determine that the existing government must be replaced using methods acceptable to both the population and the

international community. In either case, Blue will have to work with the HNG (current or newly established) and help it to discharge its responsibilities to the population. Both strategic decisions and tactical measures require concrete, reliable evidence of the delivery of services on the part of the HNG. The challenges to getting, using, and acting on the data are discussed next and are summarized in Table 4.

Table 4. Summary of Capability 2

Summary

Capability 2: Independent Tracking of Host Nation Government Service Delivery

HNG delivery of public services is a major influence on public attitudes
- Economic: Electricity, water, food, sewerage, garbage collection, jobs
- Social: Education, health care
- Political: Rule of Law, protection of liberty
- Physical: Protection of life and property

Understanding services people are actually getting is pre-requisite to:
- Understanding the basis for the peoples' complaints about the HNG
- Assessing changes needed in HNG actions to gain public support
- Influencing and partnering with the HNG to change it's actions

Initiative: Develop basis to objectively track and explain HNG services delivered
1. Secure the data needed for analyses and improve the use of it
   - Improve use of reputable, standard data and collection of specific local data
   - Identify possible in-country and local sources of data independent of HNG
   - Provide an information infrastructure to enable management and sharing of data
2. Promulgate clear message of progress being made by (or in conjunction with) HNG
   - Establish ways to communicate to the public the progress in the delivery of services

a. Obtaining Data

Obtaining data on the delivery of public services for developing countries presents a challenge. Most governments have statistics bureaus that report on birth and death rates, delivery of public health, availability of doctors and hospitals, access to potable water and treatment of sewage, provision of power, degree of education of the population, availability of jobs, and the economic basis for the nation (commerce, raw materials, transportation, and industry).

However, when a country is just developing or struggling with a series of crises, the infrastructure to acquire, catalog, and maintain records is often absent. The statistics of developing nations are often out of date and generally cover the nation as a whole without the detailed information that could speak to the lack of uniformity of benefits across the society. Without a robust local and national infrastructure, it is difficult for the government to collect accurate data with sufficient frequency to enable the United States

to assess the effectiveness of the HNG. Sending a collection team into a nation where turmoil exists and security remains a problem is not always an option.

If government data on delivery of public services are unavailable or incomplete, other data sources can sometimes be used. A number of organizations collect data on the health, welfare, and performance of countries around the world. Unfortunately, the data are scattered among many sources and are found in different formats, many of which are not immediately accessible for processing and evaluation. Nations receiving targeted assistance under the World Bank, United Nations, and other national agencies (including USAID and U.S. Department of Commerce) must report a variety of statistics used by the organizations providing the assistance to determine progress.

The difficulty in improving a developing nation's capacity to collect and report on significant metrics is a well-known problem. The World Bank sponsors and engages in a number of international efforts to develop critical data that can be used to assess progress in economic development. The global programs listed below are among such efforts [3].

- *Health Metrics Network* is a global collaboration focused on strengthening country health information systems to generate sound data for decision making at country and global levels.
- *IMF Dissemination Standards Bulletin Board* provides access to information on country statistical standards and quality based on Special Data Dissemination Standard (SDDS), the General Data Dissemination System (GDDS), and the Data Quality Reference Site (DQRS).
- *International Comparison Program* is a global initiative to produce price levels, economic aggregates in real terms, and Purchasing Power Parity (PPP) estimates through a series of statistical surveys.
- *International Household Survey Network* brings survey producers, sponsors, and users together to foster collection of more and better data and better use of available data for policy making and monitoring.
- *Marrakech Action Plan for Statistics (MAPS)* is a set of six key actions to improve development statistics at both the national and international level, agreed at the Second Roundtable on Measuring for Development Results in February 2004.
- *Partnership in Statistics for Development in the 21st Century* (PARIS21) is an international partnership of policymakers, analysts, and statisticians from all countries of the world who are interested in promoting high-quality statistics, making these data meaningful, and designing sound policies.

The above programs exist because there is a problem in data collection, in spite of the fact that numerous national and international agencies are engaged in such collections including the list in Table 5 (provided by the World Bank) [4].

Table 5. List of International Organizations

AFRISTAT	African Development Bank (AfDB)
Asian Development Bank (ADB)	European Bank for Reconstruction and Development (EBRD)
Food and Agriculture Organization (FAO)	International Association of Official Statistics (IAOS)
International Labor Organization (ILO)	International Monetary Fund (IMF)
International Statistical Institute (ISI)	Inter-American Development Bank (IADB)
Organization for Economic Co-operation and Development (OECD)	Statistics Directorate of the Organization for Economic Co-operation and Development (OECD)
United Nations (UN)	UN Development Program (UNDP)
UN Economic Commission for Africa (UNECA)	UN Economic Commission for Europe (UNECE)
UN Economic Commission for Latin America and the Caribbean (ECLAC)	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
UN Economic and Social Commission for Western Asia (ESCWA)	UN Educational, Scientific & Cultural Organization (UNESCO)
UN Industrial Development Organization (UNIDO)	UN Population Fund (UNFPA)
UN Statistical Institute for Asia and the Pacific (UNSIAP)	UN Statistics Division (UNSD)
World Health Organization (WHO)	World Tourism Organization
World Trade Organization (WTO)	

b. Assessments Using the Data

Assessment is hampered by the inadequacy of the data, e.g., lack of data, incomplete or inconsistent data, or biased or corrupt data. A vexing problem using the data is that the interpretation of what an individual entry means is not universally consistent. Even for a single country, the interpretation often changes over the years, preventing the development of highly desirable information on trends.

Assessment is also hampered by the mindset of the analyst. The average North American would consider having electric power for only 4 hours a day, or only during specific periods of the day, as totally inadequate. In the host nation, the population as a whole might well consider as adequate the provision of reliable, uninterrupted power for a few specific times a day to cook meals and boil water. The assessment must be to their standards and not to ours. By setting standards too high, Blue condemns the HNG to a program beyond the expectation of its people, and raises the peoples' expectation to

believe that they should be recipients of services on a North American scale. Assessments made to the wrong standards mark a pathway to failure.

Understanding the appropriate standard to use calls for understanding and listening to the population, to their demands, expectations, and desire to take control of their own lives. In some countries, like Afghanistan, the host government and the population will be developing a sense of nationhood at the same time as they build or rebuild their infrastructure for the delivery of services. This type of situation makes the task more difficult. Only by understanding the fragmentation of the population and knowing how to engage at the level of their fundamental values as well as their needs can Blue hope to succeed.

c. Acting on the Assessment

The way Blue (or any group/coalition) helps the HNG develop its infrastructure is as critical as the choice to help. In 2005 the U.S. joined more than 120 nations and a large number of international and civil organizations (typically non-governmental aid organizations) in signing the Paris Declaration on Aid Effectiveness [5]. Since that time, the five principles of the Paris Declaration have shaped the U.S. action agenda for foreign assistance [6]:

- *Ownership:* Partner countries exercise effective leadership over their development policies and strategies and coordinate development actions.
- *Alignment:* Donors base their overall support on partner countries' national development strategies, institutions, and procedures.
- *Harmonization:* Donors' actions are more harmonized, transparent, and collectively effective.
- *Managing for Results:* Managing resources and improving decision making for development results.
- *Mutual Accountability:* Donors and partners are accountable for development results.

These five principles are intended for civilian assistance to a nation in need. For nations already in crisis, however, the presence of the international community is more likely to be military rather than organizations of economic or humanitarian assistance. The organizational culture of the military is not the organizational culture that framed the five principles for international assistance. The timelines in military intervention are distinctly different from those for international aid and development. The fact that the

U.S. military is now engaging in nation-building creates a problem for a military culture trained to execute reasonably well-specified tasks with speed and accuracy.

Nation-building is complex and messy, involving significant interpersonal skills and tasks not part of the military training set. For the United States, nation-building requires a strong interagency collaboration at a time and in a space traditionally handed over to the military—when security is not guaranteed and where the battle moves erratically on a daily basis. Under these circumstances, collaboration is both necessary and difficult to achieve. Moreover, it must extend to all elements of the solution including governmental and non-governmental agencies active in the host nation country. These include aid and philanthropic groups that might not be considered a part of Blue, trading partners with whom an economic future can be developed, and international health and medical organizations. Unity of effort among all these components is an essential ingredient to building a stable future.

An approach developed in the U.S. to foster interagency collaboration is the Measuring Progress in Conflict Environments (MPICE) [1]. The methods advocated by MPICE resulted from an interagency collaboration and are currently being tested in Haiti and Afghanistan. MPICE also stresses the need to collect information, both statistical data and perceptual data. The latter type of data is essential to understanding the response of the population to efforts undertaken to assist the HNG in developing its capacity to serve the population.

3. Capability 3: Models and Tools for Influencing the Population's Attitudes and Actions

With increasing frequency, irregular warfare requires soldiers to patrol urban and suburban areas where the enemy lives, recruits, and operates—and where the enemy is often indistinguishable from the citizens the soldier must protect. Every aspect of the military mission now requires understanding the human dimension: Who are the locals? What's important to them? What groups, factions, or external interests are important? The rush to answer such questions for Iraq and Afghanistan has generated an as-yet-unfocused demand for cultural information. The type of information needed for diverse military missions and the tools and models essential for making effective use of that information have not been determined [7].

In dealing with ongoing contingencies, the military has turned to the only form of model readily available, namely mental models, for organizing information and thinking

about the problem. Mental models are necessary, but until written down and examined, they remain black boxes resistant to the probes of analytical thought and criticism. Unexplored hypotheses and giant leaps of faith remain buried in the bold conclusions of the mental model, often in the expectation that everyone else understands and agrees with the unspoken, underlying tenets. The complexity of the issues and the effect of misunderstanding them should drive us to expose and examine our mental models, making explicit the hidden assumptions and calling attention to scarce or missing data.

Even when more formal models are used, they are too often adopted because they worked for other problems rather than because they are precisely suited to the issues at hand. Stuffing a model with data and applying it without hard criticism of its applicability is an approach prone to disaster.

Understanding the population and how to influence it in a meaningful way requires a toolkit and a well thought out methodology for applying it. A careful and explicit framing of the problem would provide an excellent starting point for a set of models and tools. Starting with a simple approach such as:

- What specific end do we wish to achieve?
- What people, groups, and organizations are players or influencers?
- What tools are available for applying to achieve the desired end?

The second question points to a need for a detailed demographic understanding of the population, Red, Blue, and those who might exercise influence on them. Annex A to this chapter is a form of taxonomy of information needed to understand the population from the perspective of influencing its decisions. It pertains directly to the information needed for Capability 1.

If Blue can define the desired end state and has a functional understanding of the population, the third bullet suggests that there are ways Blue can work to achieve the desired end state. The MPICE framework for measuring progress in conflict environments considers drivers of conflict and institutional capacity (on the part of the host nation) in the following areas:

- Political moderation and stable democracy
- Safe and secure environment
- Rule of law
- Sustainable economy

- Social well-being.

These areas correspond closely to desired end states. MPICE also defines the type of information needed to assess the host nation's capacity in each of these areas. This second information framework is applicable to Capability 2 in that it addresses the ability of the host nation to deliver essential services.

The simple, three-step decomposition of the problem has led to two sets of data needed by formal models that would assist the user in developing courses of action—information about the actor's desires and needs and information about the ability of the HNG to provide for those needs. Further, these two sets of complementary data (actor and HNG) form a bridge between the two capabilities.

If these two approaches (understanding the actor and the capabilities of the HNG) provide a framework of essential information, then the next step is to make that framework explicit in terms of a taxonomy, an ordered list of data needs. The role of a taxonomy is to be comprehensive and to aid in the exchange of information. It is not a pathway to solving a problem, merely a framework for targeting and storing specific information needed to solve the problem. To make the data gathered useful for a specific problem, a different framework, something resembling a problem-specific template is needed. The template would highlight specific parts of the taxonomy relevant to the immediate problem. It might also suggest a selection of models capable of using those data to assist the decision maker in drawing conclusions.

Model and tool providers often come from the computational sciences with insufficient collaboration with domain (including social science) experts. They apply known methods to a variety of problems. They do not normally explore a problem space with the intent of mapping out the variety of models and tools that are both relevant to that problem and grounded firmly in social science theory. This orientation of the modeler creates a problem for the user who is anxious to solve a problem and impressed by the availability of a slick tool. The user has no way to examine the assumptions built into the model. In fact, the model developer as a computational scientist may not understand all the assumptions and how they affect the current problem.

The development of a problem-specific template, complete with a selection of models, requires an inter-disciplinary approach by a team without vested interest in a single model or approach. Success depends on the willingness of the team to conclude that, for a specific problem, no adequate models or tools are available.

The military has long experience using modeling, assessments, and tracking tools, but these tools have rested on laws of physical sciences and judgments of military professionals. Developing models and simulations that work with cultural, social, political, and economic data and incorporating them into our existing capabilities can be a daunting problem. Few tools address a significant fraction of the problem space, and none work across the entire socio-cultural, political, and economic domain.

The diverse drivers that affect the attitudes and opinions of the population are multi-disciplinary. This confounds the military modeling community whose expertise often rests in handling kinetic models (physics-based where even probabilities rest on well-documented performance data). In the social sciences, only the economic models come close to the types of relationships the military work with in their simulation spaces.

Figure 5 shows a taxonomy of models. The comfort zone for DoD is to the left; however, the modeling capability in the socio-cultural domain is to the right. Furthermore, while military decision support systems use artificial intelligence (AI) tools like neural networks, the underlying relationships in the training sets are supported by what might be termed "hard data." In contrast, the models to the right rely upon "softer" heuristic relationships. They depend on data collected by experts outside the military, and often outside the government. Even when the more traditional systems dynamics models are retooled for use in the social sciences, they must base their interactions on soft heuristics and data that are hard to collect.

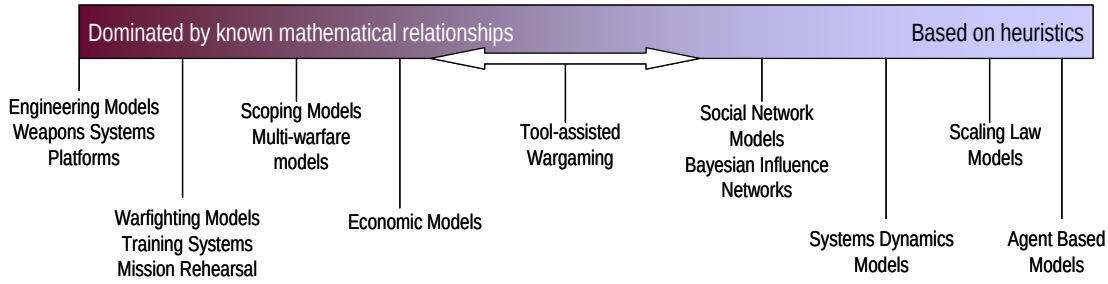

Figure 5. Taxonomy of Models

Until recently, no high level advocacy existed in DoD for developing the types of models and tools most useful for handling the human dimension of conflict or nation-building. The Director for Defense Research and Engineering (DDR&E) now has the authority and resources to direct development of such capability. Results will not be instantaneous. The process will require time as well as input from many outside the normal defense establishment. The techniques that result will have to be refined and

made robust through collaboration between the research and operational communities before being deployed and employed knowledgeably by the end user. While the work is difficult, there is no reason why coordinated, well-focused efforts cannot produce a suite of models capable of informing decision making and improving both education and training. A summary of Capability 3 is given in Table 6.

Table 6. Summary of Capability 3

Summary

Capability 3: Models and Tools for Influencing the Population's Attitudes and Actions

Understanding how people are influenced is pre-requisite to influencing them
- Informal mental-models are often used, but are hard to share and to update
- Formal models are needed to understand the appropriate actions and communications channels for influencing the population

Formal models for influencing population can exploit recent modeling work
- Typologies developed for USSTRATCOM in "Deterrence in the 21st Century" (10/07) coupled to the MPICE framework for data collection and assessment
- Retrospective analysis tools developed for WMD-Terrorism JIPOE
- Social Network Analysis tools

Initiative: Develop formal models based on this work + tools to use them to
1. Model divisions within the people (ethnic, religious, economic, age, experience)
2. Identify leaders of each group and the source of their authority
   – Political/legal position, control of resources, control of military, charisma, influence
3. Identify the decision-making process within each group and how to shape it
   – Rational, sense-making, heuristic, reliance on experts
4. Model the interactions of various groups in context of capabilities and actions of the HNG

4. Capability 4: Forward Headquarters and Units with Reach-Back to These Methodologies, Data, Models and Tools

> Conducting military operations in a low-intensity conflict without ethnographic and cultural intelligence is like building a house without using your thumbs: it is a wasteful, clumsy, and unnecessarily slow process at best, with a high probability for frustration and failure. But while waste on a building site means merely loss of time and materials, waste on the battlefield means loss of life, both civilian and military, with high potential for failure having grave geopolitical consequences to the loser [8].

The above comments by members of the Human Terrain System reflect the view of the tactical warfighter thrust into an environment where the enemy and the population are nearly indistinguishable. But the problem is not confined to the forward-deployed soldier.

At national and theater levels, issues involve long-term economic stability, political stability, the effect of foreign influence, and whether a change in a pattern of national hostilities is reflective of real instability. A Regional Combatant Commander needs to assess how to use his resources in dealing with diplomatic contacts, establishing or continuing military-to-military cooperation, and providing emergency aid or other infrastructure assistance long before violence erupts. Accurate assessments require understanding the societies and cultures in question and how they respond to external influence.

Once violence erupts and forces are on the ground, local commanders produce military plans based on guidance from higher headquarters. These plans must take into account the values, customs, activities, and beliefs of the populace, but neither U.S. training systems nor planning systems yet adequately deal with this type of information. Tactical and operational planners in theater and in forward operating bases must rely on the evolving acculturation training provided during their pre-deployment preparations.

The Human Terrain Teams deployed with battalions in some areas of Iraq and Afghanistan have been highly useful in helping commanders understand the local socio-cultural world. A small reach-back capability answers questions of the deployed social science teams, but significant gaps in infrastructure prevent the fullest use of this information.[3] The links to the reach-back capability are one-to-one when they should be one-to-many. There is no provision for the national and regional Blue leaders to benefit from information gleaned by cultural teams. Without the infrastructure to share detailed understanding of local groups, a potential beacon of understanding is confined to isolated pinpoints of light.

The information requirements at these several levels are not disjointed, but rather represent a difference in emphasis.

- Strategic planners need to understand the society as a whole and some detail about the component parts to interpret correctly activities and events in a nation or region.
- Operational and tactical planners need highly detailed understanding about the nature of the socio-cultural environment in which they are operating. This must be sufficiently detailed for the targeting of information operations and

[3] Existing infrastructure inhibits interchange of information among all Human Terrain Teams deployed in neighboring regions. The software deployed with the teams is often written over when their computers are brought into conformity with the rest of the equipment in the battalion.

establishment of strong, positive relationships with the indigenous population to whom the security and governance must be transitioned.

- Those on the ground must have sufficient knowledge of the cultural mores to avoid the kind of tactical error that results in a strategic issue.

Failure to understand the society and environment at the strategic level puts the deployed soldier at a disadvantage, having to build the map rather than fill in details on a well-constructed map. At the same time, the commander responsible for the nation or region needs current feedback on the attitudes of the population in much the same way that persistent surveillance brings a better understanding of the physical battlespace. The local commander should not have to ask, "What are the local tribes, cultural groups, or factions?" That information should be in hand as he enters the theater. His questions are more aptly focused on who are the current leaders and what are their immediate and long-term objectives.

The effective use of models and tools discussed in Capability 3 presupposes well-trained users. Such preparation is not currently a part of the training of military personnel, and perhaps training soldiers to wield models is not appropriate. Instead, the expertise to run models and assess the output could exist at a national or regional level, even if results are needed at the local level. Running models and answering detailed questions requires in-depth knowledge of a specific culture or social environment and so is best done at a reach-back cell.

Finally, there should not be a need to scramble early in a contingency for socio-cultural information in a region of known interest. That information should be gathered and stored over years of dealing with the region and disseminated as the need arises. This argues for a structure for gathering, storing, and disseminating information along the lines of shown in Figure 6.

The Regional Combatant Commands are an important link in this infrastructure. They maintain "country desks" for their areas of responsibility, but there is no common specification of what information would be useful to collect, nor is there a framework for storing the information they have. If there were a common methodology and data framework, Regional Combatant Commands could use it to assess their progress in working with the countries in their area of responsibility and to provision a subordinate commander working with or in a local nation with valuable information. Such an infrastructure enables islands of expertise to provide the long-term understanding needed to help prevent armed conflict and to engage smartly in times of conflict.

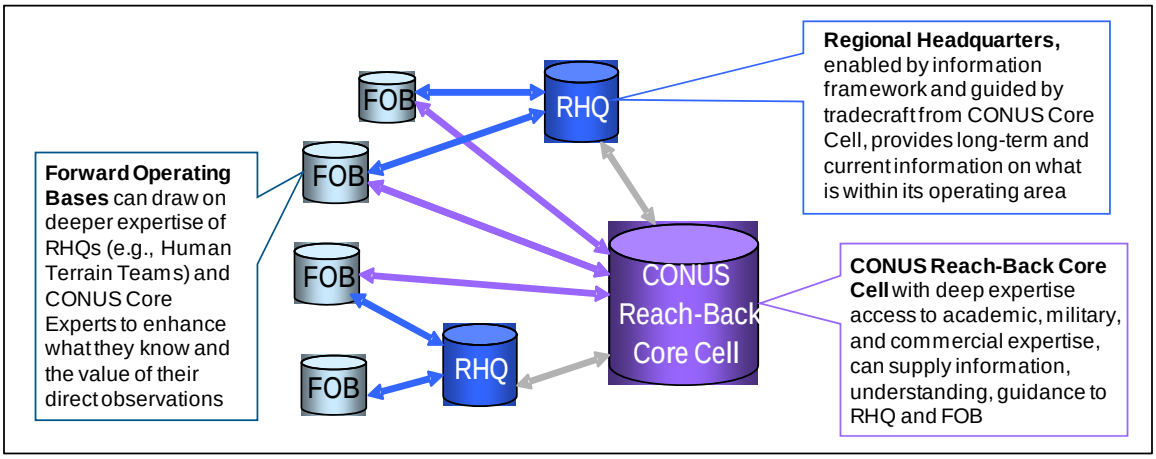

Figure 6. Information-Sharing Framework for Cultural Understanding

A summary of Capability 4 is shown in Table 7.

Table 7. Summary of Capability 4

Summary
Capability 4: Forward Headquarters and Units with Reach-Back to These Methodologies, Data, Models, and Tools

Broad and deep understanding of HNG and population requires expertise
- Education, training, experience, tradecraft beyond what is in overseas HQ and forces

This understanding and expertise needed at strategic, operational, tactical levels
- A common information framework and appropriate division of expertise could tie these levels
- A well–structured taxonomy is key to being able to access, store, manipulate and use data

Three levels can be readily envisioned: CONUS, Regional HQ, Forward Bases

Initiative: Develop the information infrastructure, reach-back capability and information sharing needed to link tactical, operational and strategic levels of cultural information and data.
1. Develop the case for a distributed, socio-cultural information system
2. Define a CONOPS for the functioning of such a system
3. Determine the means for staffing a reach-back capability
4. Assist in the coordination of taxonomies, models, methods and approaches to gathering and sharing socio-cultural modeling

D. DIRECTIONS FOR S&T INITIATIVES TO SUPPORT CAPABILITY IMPROVEMENTS

A single set of related technologies emerged as a common need across all of the capabilities—an information infrastructure to support the acquisition and management of data and analytical tools to use the data to inform DoD's irregular warfare missions. The extent of information required, the diversity of expertise needed to acquire it, and the

multi-disciplinary nature of the analyses argue for a federated approach in building and sustaining capabilities discussed in the previous section of this report. Regular warfare is a complex and messy business, irregular warfare may be even more so. Military training and particularly military education systems still have a long way to go to prepare the military decision-maker for nation building and associated missions. There is an especially large gap in the preparation of our military when the human complexities are included in (1) operational planning, (2) intelligence preparation of the operational environment, and (3) preparation for deployment in foreign cultures. Experiments, exercises, and training will be important to enable the military to learn about the benefits but particularly the limits of tools built upon social sciences. Thus the final S&T thrust focuses on training tools. The S&T initiatives that support the capability improvements are identified and discussed in the rest of this section and are summarized in Table 8.

Table 8. S&T Initiatives

Directions for S&T Initiatives to Support Capability Improvements
1. Develop a Federation of Stakeholders for Collaboration
2. Structure for Consistent Socio-Cultural Information (to manage, share, manipulate data)
3. Tools for Better Data Collection
4. Tools for Better Analysis of Socio-Cultural Information (enable assessments, projections, re-targeted collection)
5. New Formal Models and Tools (guide data collection, developing formal models)
6. Interactive Training Techniques (each area, all echelons, all agencies involved)

1. Develop a Federation of Stakeholders for Collaboration

Influencing the attitudes and actions of a host nation's population depends on understanding the detailed demographics of the population and the complex web of interactions among the groups in the population, between the government and the various groups, and with a wide variety of external communities and forces. The previous discussion of capabilities emphasized the role of reliable, accurate information in creating the foundation for effective action. Although data are not ends in themselves, they are needed to inform the development of robust theory and to populate models, particularly those that are data- rather than theory-driven.

Given the wide variety of socio-cultural data and information needed, it is unlikely that one group will be the sole source and purveyor of all the data. Expertise exists in academic, industrial, interagency, law enforcement, and intelligence domains.

The most realistic solution is to create a synergy among these centers of expertise, avoiding duplication while capitalizing on the expertise that exists through a federation of capabilities. It would build shared awareness across Blue forces and the aligned entities working within the host nation to enable synchronized, mutually enhancing decisions about the collection of new socio-cultural data and its effective use in coordinated efforts to influence the population and assist the HNG in achieving long-term stability.

The term "federation," often associated with political structures, is defined in the following way:

> Federate: to unite into a league
>
> Federation: a federated body formed by a number of states, societies, etc., each retaining control of its own internal affairs [9].

The critical point is that each federated entity chooses to unite its expertise with the overall federation without losing control over its own affairs. Adjustments that have to be made to form the federation are captured in the agreements or articles of federation drawn up among the participants.

Creating a federation—an aggregate entity with the desired capability and integrity while maintaining the integrity and sovereignty of each member—is a difficult process. The quality and capacity of the federation depend on the strength of the agreements among participants. Ideally, the agreements are made among all participants, but issues of information and communication security may require that some agreements be among segments of the federation. For example, a coalition of Blue forces will normally exchange information based on prior international agreements; however, there are few information-sharing agreements among the non-governmental entities and between these organizations and either the Blue forces or the HNG.

To assure that both sources and recipients have a common, clear understanding of the form, meaning, and provenance of the data, information, or models being shared, the agreements must describe the interfaces between and among the parties including:

- The nature of what is to be made available
  - Data or information
  - Models or results of models
  - Metadata descriptions of what is to be exchanged
  - Update rates of the information and data sources

  - Provenance of the material: it's origin, how it is interpreted by the originating party, any processing done to it, some sense of validity or trust
- To whom the information may be given
  - Whether or not subsequent wider distribution is permitted
  - Whether the source of the material can be identified
  - Any other restrictions in the use of the information or in subsequent analyses that use the information
- Anything else needed to clarify the information, its handling, its use, and dissemination of products that incorporate it.

Typologies, taxonomies, and ontologies[4] are foundational to the ability to share data. While these three terms differ in organizing principles and levels of representation, they all refer to the creation of a framework for information management—categories and relationships to which observables and data can be attached. However, in the context of federation, the manner in which typologies and taxonomies are managed among federates is critically important.

Typologies organize data or pointers to data. A typology should be thought of as a structure of branches and leaves that break down the data required to describe the problem space. The leaves are storage units for data the analyst requires.

Leaves could also point to other relevant typologies and data sources. This distinction is vital to federation creation. Many centers of expertise that would become part of the federation have developed typologies, taxonomies, or ontologies appropriate for their specific tasks. The temptation to discard these existing structures and replace them with a new typology must be rejected. Starting over would cripple the capability of collaborating partners who must continue to serve their primary customers.

To mitigate the difficulty of sharing data, the organizations involved have to expose the content and structure of the data they intend to share so that their various partners can create appropriate interfaces.

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[4] Typologies are collections of representations or characteristics descriptive of a class of objects. Typologies tend to be comprehensive lists, but they may not have a hierarchical structure and the characteristics may be duplicated in more than one category. Taxonomies are also classifications, but they are most often structured and hierarchical. Categories are designed to be mutually exclusive preventing the same datum from being found in more than one location. Ontologies are structured and hierarchical as are taxonomies but are designed to deal with concepts. In addition to the hierarchical structure, ontologies have sets of axioms that constrain the use of terms as a means of guaranteeing the shared understanding or meaning that enables their use for computational purposes.

The first step in developing a typology or taxonomy is to agree on the meaning of a given datum, the manner in which it is derived (including data collection methods and processing) and the standards for reporting. Recognizing the critical need for statistical information suitable for use in comparing economic and civil development, the international community led by the United Nations adopted a program of standards and good practices for statistical data in support of sustainable economic, environmental, and social development [10]. Ideally, the information sharing network shown in Figure 6 would represent the DoD component to a much larger, interagency and international network of information sharing shown in Figure 7.

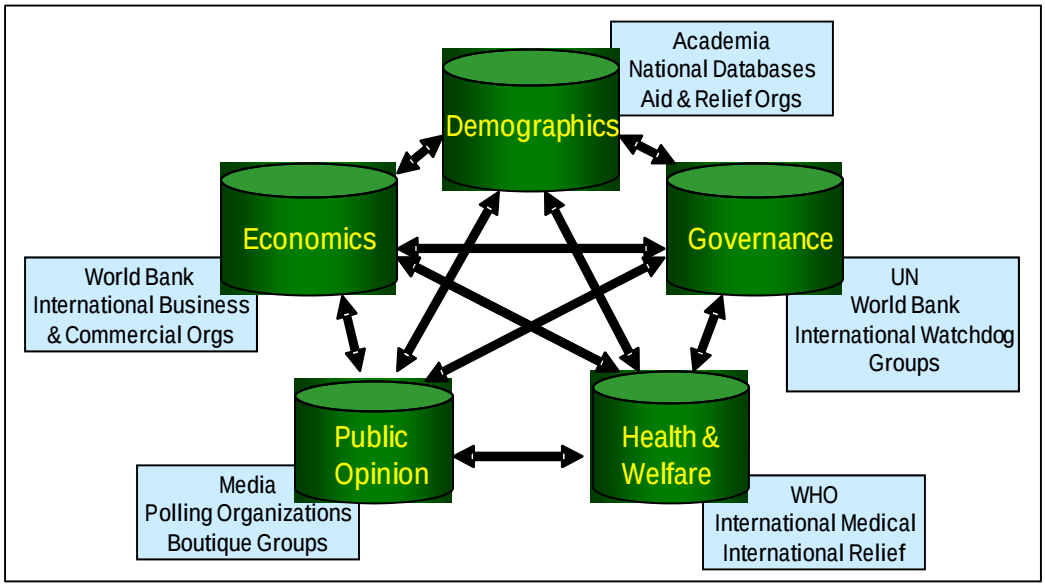

Figure 7. Information Sharing Federation

While the DoD should not drive the development of such a broadly based network for information sharing, the various agencies of the United States, (including DoD), should be an active participant in the international venues where information standards are developed. Defense in particular, as a major investor in information technology, should make a point of leading the move toward data sharing among its components and with the other U.S. agencies.

The issue of data sharing leads to a significant problem for which there are emerging technological solutions. However, application of these solutions in today's security environment is complicated by existing security agreements, which are both complex and convoluted. Most were developed over time, adding new restrictions to existing agreements each time a new problem arose. Parsing these agreements often

exposes rules that contradict each other. The lack of clear logic makes it nearly impossible to create software to manage information flow. Functional federations require clean, non-contradictory rules for the automated exchange of data and information among participants—rules where the logic is conducive to implementation in software.

2. Structure for Consistent Socio-Cultural Information

One common thread among the identified capabilities is the need for an infrastructure to enable the acquisition, management, and sharing of the wide variety of socio-cultural data and information on the host nation and its population. There is no generally accepted taxonomy for the management, manipulation, and sharing of socio-cultural information relevant to military missions.

a. The Problem of Multiple Independent Taxonomies

Various organizations with partial mission focus are developing their own, independent, non-sharable data structures. The problem with such efforts is that, without the vision of making the data accessible to multiple echelons and missions, the developed structures will be semantically inconsistent and stove-piped and will inhibit the integration socio-cultural information across the full scope of military missions. The players in taxonomy development include (but are probably not limited to) the following:

- The Human Terrain Teams Program whose task of developing a taxonomy solely for the use of the forward commander (below Brigade) has been given to the U.S. Army Corps of Engineers.
- DIA, a long time player in "human geography," is undertaking the development of a taxonomy that will be based on the Military Intelligence Database (MIDB) rather than a newer, more flexible taxonomy that could be interfaced with the MIDB.
- National Geospatial-Intelligence Agency (NGA) has espoused the notion of providing the "human terrain" as it is the provider of the geophysical terrain and is working on its own taxonomy to enable the production of human terrain maps.
- The Marine Corps Intelligence Activity (MCIA) has been the purveyor of cultural information for areas of military interest for many years with a focus on the ability to function in a society (not to understand the decision making of the factions within the society). MCIA has been designated by others as the DoD activity responsible for the socio-cultural taxonomy despite MCIA's opinion that the field is not sufficiently mature to support a full taxonomy.

- A team working for U.S. Strategic Command (USSTRATCOM) and under the guidance of the Joint Staff J39, in developing an information structure usable for acquiring and storing the socio-cultural data for building a decision calculus for deterrence, created a set of typologies including one that refers specifically to how groups from different cultures approach decision making. This aspect of a society is important not only for deterrence but for operational planning and interacting with the population.
- The newly established DDR&E program in Human Socio-Cultural Behavior (HSCB) has recognized the lack of data to support basic and applied research in the social sciences and is framing a program of data acquisition that will then require a taxonomy if the data are to be made available to the academic and industrial research communities.

One problem with the rush to build socio-cultural taxonomies is a misalignment of resources and capability. DoD and the intelligence community have the resources, but the bulk of social-science expertise resides in the academic community. Except for the work done through the Joint Staff, and potentially that emerging from DDR&E, none of the above taxonomies will be accessible to the broadest academic community (i.e., the academic community not under direct contract to DoD). Hence, most of the efforts will not have the benefit of criticism by academic experts. Unless they have direct involvement with the development and the taxonomy and open access to it, the academic community, with all its potential for contributing data, will not use it for their data. Thus, the military will lose the benefit of research by communities that often have access to areas not openly welcoming of the U.S. military or even the U.S. Government.

b. What Constitutes Data?

The second issue is the interpretation of "data." For many academics and intelligence analysts, data mean sets of documents containing information about subjects of interest. A highly recognized database of socio-cultural information is the Yale University Human Relations Area Files (HRAF) [11]. The collection, the work of a consortium of more than 300 educational and research institutions from 30 countries, consists of over a million pages of information about nearly 400 cultures and is organized according to the *Outline of Cultural Materials (OCM).* The OCM contains a list of more than 700 subject codes or searchable descriptors. Collections such as HRAF are composed of "unformatted text" or "unformatted data."

In contrast, the Global Terrorism Database (GTD) [12] developed by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) at the

University of Maryland is a structured database with information on nearly 80,000 incidents of international and domestic terror reduced into more than 120 variables suitable for use in computational models. The GTD stores quantitative data extracted by a well-structured, human-intensive, analytical process from thousands of pages of open source reports. To a modeler, HRAF is not data, but rather represents a daunting amount of material that has to be systematically converted into data.

The organizational structures of these two examples of databases are very different. Neither represents a taxonomy suitable for the militarily relevant socio-cultural data; however, any DoD taxonomy should have interfaces to both HRAF and GTD. A DoD information structure would have to accommodate both structured and unstructured data.

c. Separated by Granularity?

The emergence of disparate and uncoordinated efforts to build socio-cultural taxonomies affects DoD directly. While different missions and echelons in the military need information that differs in the granularity and detail of the data, much information will be common across all missions and echelons—e.g., the names of cultural or social factions or different languages used in a given country or region. Without some coordination across the efforts, vital information will not be readily shareable. Lack of ability to share data and information within and across interagency groups has been well documented after the events of September 11, 2001.

d. Data Model or Exposed Interfaces?

The ideal solution to a large problem in organizing data is a strong data model, developed and accepted by a wide (preferably international) community. However, this is a long, expensive process and best initiated only when the data sets involved are reasonably well-established.[5] The socio-cultural data needed for the variety of military uses, from strategic planning to tactical mission support, is drawn from multiple disciplines. The relationships among the component parts (political versus economic

[5] Two such data models are SEDRIS (Synthetic Environment Data Representation and Interchange Specification), an international standard for representing the physical environment including atmosphere, ocean, terrain and physical objects on the terrain, both natural (trees, rivers, etc.) and man-made (roads, bridges, buildings, etc.) and C2IEDM (Command and Control Information Exchange Data Model), a NATO standard for exchanging the type of command and control information normally included in messaging and planning. Both standards required years of funding and effort to develop after which several years were spent maturing the standard to the point where international committees would accept the product.

versus ethnographic) are not well-established by their respective technical communities. Thus, the most viable approach is to develop smaller taxonomies with well-specified code books to aid semantic understanding and well-defined, exposed data interfaces for data distribution and sharing.

e. Who Owns the Problem?

In a sense, everyone owns some of the problem. But the program with multi-year funding and the responsibility to address multiple user requirements is the HSCB effort in DDR&E. The issue here is the need to have this program committed to address the diverse operational needs of DoD elements, to coordinate and make sure the various DoD efforts are interoperable, and to gain the active participation of the research community. This would enable DoD to make the best use of its own resources and to exploit private sector research, both national and international.

3. Tools for Better Data Collection

Collection of socio-cultural data presents a number of problems for the researcher and operational user alike. The following discussion focuses on four aspects of the problem. The first two aspects follow the theme touched on in the prior section, namely, the challenges presented by structured and unstructured data, and measures to expedite access to structured data sets, unstructured texts, and media. The last two aspects are ways of eliciting information first from the population through polling and then from interviews with subject matter experts.

Structured Data are critically important for describing the host nation in terms of demographic, social, political, and economic information and for assessing the HNG's provision of security and basic necessities for its people. For many nations of interest the best information will come from a variety of international data sources. Until the international efforts to standardize national statistical data produce results, there will be a lack of data consistency, both in content and format. Nevertheless, it is still possible to develop a framework, if not a full taxonomy, for extracting statistical data from the best national and international sources. Given a framework, it is possible to develop a filter to translate data from their original form into that required by the framework. Academic and operational users could then create a picture of a given nation quickly, certainly much more quickly than their current process of searching for applicable data sets and creating unique filters for each case and end user.

In developing the framework, the consortium or user group should also develop the code book and data criteria needed to convert information in unstructured sources into structured data in a commonly understood and accepted manner. The standards for the code book should be consistent with those being developed by the standardization efforts led by the World Bank and United Nations.

Unstructured and Vernacular Data are the primary sources of timely information on the host nation, its state of health, and the situation (or plight) of the population. Most unstructured data are currently mined from media sources available on the Internet, largely in English or the handful of languages for which reliable translators are available.

The search engine that does data mining is often tightly linked to a highly specialized processor that automatically extracts a particular type of information to display for the user. Some processors extract "opinions," others extract names for social network analysis, and others extract linguistic features that can identify a particular author. As the need for socio-cultural information grows, one can easily imagine the end use having a dozen search engines mining the same sources, each producing a different end product.

Needed: A robust search engine to mine sources for multiple post-processors.

The ARGUS program [13] developed a search strategy that could be an initial step to developing a robust search engine. ARGUS seeks early warning of epidemiological events by looking for social unrest that often precedes identification of an epidemic. The thesaurus used for the search is based on a taxonomy. Once documents are located, ARGUS uses Bayesian relevance filters to assess which articles are most strongly related to a potential epidemic and prioritizes the mined articles accordingly. Vernacular articles are not translated by machine except for a handful of languages for which machine language translation is trusted. Therefore, the prioritized set of mined articles is sent to translators who extract the critical information. ARGUS mines and delivers a set of articles in the vernacular. Its post-processing is restricted to prioritization. The ARGUS methodology could lead to the development of more robust search engines.

It is not likely that a single search engine will suffice, but a limited number of engines delivering sets of articles for post processing would reduce the expense of data mining.

Needed: Better language translation capability.

Language remains a problem for automated data mining. Thus there is a critical need to expand the set of languages for which automated translation is viable.

Needed: Additional research into the capabilities of statistical linguistic analysis.

Statistical linguistic analysis uses the "bag of words" approach to data mining and extraction. Of the methods of content analysis, "bag of words" is the most easily translated. Statistical linguistic analysis offers considerable promise for analyzing unstructured text, but additional research is needed to realize its potential.

Needed: Training and development of data coding expertise.

The reduction of unstructured data into structured form for use by computational models is a human-intensive task. The first step in at least semi-automating this process of data coding is to work with universities to understand the methods used and accuracy problems. The second step would focus on isolating one or more types of data that would be amenable to machine processing.

Polling and Survey Data are often the only way to assess the attitudes of the population and their reaction to the activities of the HNG. There are essential characteristics of both polls and surveys:

- The instrument used must be applied to a statistically significant number of each major demographic group. Therefore, the pollster must have an accurate picture of the demographics in the host nation.
- The "instrument"—the set of statements and questions that constitute the matter of the survey—has to be culturally appropriate for the host nation population. The end user of the poll may attempt to craft the questions, but if a cultural difference exists, someone who understands both cultures will have to rework the material to extract the desired information.
- The manner in which the poll or survey is administered must be sensitive to the environment. Polls in developed countries are often done over the telephone. This may not be an option in many developing countries. The person asking the questions must not seem threatening to the local population. That person's behavior must follow cultural norms, be sensitive to body language, and have an idiomatic command of the language. Where the questions are posed can be as important, particularly if the host nation is experiencing violence at the time of the poll.

Polls and surveys are not tools to be developed and used by novices, particularly in cross-cultural situations. DoD should invest in learning how to develop and use these tools for regions experiencing violence. While polls and surveys are components of

sociology and political science curricula, the depth of experience resides in the major polling and survey research companies.

DoD needs collaborative relations with one or more of the major polling and research companies. The DoD basic research community would benefit significantly from access to worldwide data from a major polling house to hone emerging tools and concepts. Such access would require a special research partnership because the instruments used and results acquired by major polling houses constitute their proprietary edge on the market, and sharing is difficult.

Expert Knowledge is often sought by the military to provide insight into the culture and mindset of both the HNG and the various factions within the population. Unlike polling in which a single, identical set of questions is administered to a statistically significant number of the demographic groups, extracting knowledge from subject matter experts relies on encouraging one individual to provide information based on his professional training or perspective. A small set of common questions may be used as the basis for understanding biases and recognizing hidden agendas.

Using a number of subject matter experts helps uncover biases and hidden agendas. The cultural background of the subject matter experts and the conditions in their native country determine whether an interview can be done in a group or must be conducted individually. The set of questions used to initiate the conversation should be sufficiently flexible to allow the experts to expound on their areas of expertise. Asking experts what sources of information they favor can be useful in discovering biases and in providing insight into the best modes of communication among the target population.

The limitation to extracting information from subject matter experts is the skill and training of the interviewer. DoD should exploit social science research to document a set of best practices for interviewing subject matter experts and detecting biases. This compendium should form the core of a training program for those who will be called on to extract information from foreign experts. Clearly, interviewing techniques will have to be adjusted for the specific cultural background of the subject matter expert.

4. Better Analysis Tools

Once high-quality statistical and opinion-based data are available, the analyst will require more capable tools to use those data to enable assessments and projections and to collect new data where gaps exist. While good analytic methods are applicable to statistical data or to opinion data, there is little research on how to combine statistical data

and opinion data to gain additional insight. This would be important in examining the effect of the HNG's delivery of services to the population. The statistical model would measure facts on the ground but the opinion poll would reflect local attitudes to perceived conditions. Both are essential to understanding what is really happening and in finding ways to increase public confidence in the HNG. In human situations, perception is reality. It is important to understand when it is necessary to bring that perception closer to the reality of improved performance on the government's part.

a. Statistical Models

A number of models have been used with mixed success by the analytic community. Those most readily adapted for operational use rely on statistical data and formatted information extracted from reports through human-intensive data coding. Various forms of regression analysis can provide differentiating characteristics of groups or nations. Trend analysis is possible when statistical data are available over many years. Availability of data is the primary barrier to effective use of these models. However, analysts often lack an understanding of statistics and use models with partial data sets that produce misleading results. Effective use of statistical models requires training in the proper use of the models as well as accessing large, structured data sets.

b. Game Theoretic Analyses

Analyses built on game theory have been used for a number of purposes, most notably in understanding approaches to negotiations in arms control during the Cold War. In that context the one-on-one game provided valuable insight. Using a game theoretic approach for irregular warfare is more difficult because of the many sides involved. Solutions become computationally intractable. One approach has been to break the many-on-many sides in irregular warfare into a sequence of one-on-one plays. Unfortunately, order matters, and the game must be played many times over to yield a single solution. Some three-sided games have met with limited success. New approaches are being evolved, but additional research is needed to make any of these approaches applicable to the complex environment of irregular warfare.

c. Agent-Based Modeling Approaches

The analytic community has begun to explore agent-based models as tools for understanding complex, socio-cultural dynamics. They are appealing because their overt structure looks like a natural expression of the problem. However, their use as analytical tools presents two problems. Agent-based models are built to allow emergent behavior,

and this prevents tracking cause-and-effect relationships often desired in analysis. Each execution of the model yields only one sample in a potentially large ensemble of results. Therefore, an agent-based model must be imbedded in an analytical framework that collects and categorizes the result of each of many execution runs. These remain models appropriate for sophisticated researchers, not operational end users. Additional research in their application and training in their use is needed before they become analytic tools, however great their promise.

d. Multi-Disciplinary Models and Integration Frameworks

Society is complex and to understand it the academic community has broken it down into discrete parts: political science, economics, sociology, anthropology, psychology, etc. Like Humpty Dumpty, it's difficult to put back together. The intellectual capital needed to build the connective tissue linking the various disciplines together does not exist. To compensate, several computational frameworks have been used with varying degrees of success, but none is acknowledged as the appropriate method or tool for analysis.

- *Systems dynamics*, a method developed by Forrester in the 1950s, uses reservoirs, flows, and feedback loops to let the user combine resources or influences of very different types into a single, interrelated system. A number of software packages make system dynamics-based tools accessible to the casual user through use of default values. The user is often unaware of these hidden relationships and may not be able to assess their suitability for his problem. The accuracy of the model depends on the ability to specify the mathematical dependencies of the different components—relationships not supported by robust theory. The system the user builds must also be mathematically bounded—another problem not always accessible to the user. The math is complicated and non-linear and the results are hard to validate.
- *Bayesian inference networks* look very much like systems dynamics models, but are based on probabilities rather than feedback loops. The user lays down all the moving parts of the puzzle and expresses their interactions in terms of the probability that one will influence the other. The probabilistic models do not have the same bounding problems as systems dynamics models and the user has control over probabilities. They may provide insight, but they fall short of being solid analytical tools.
- *Plug-and-play frameworks* are often regarded as the panacea of the modeling world. Several frameworks have been proposed, some built on agent-based models and at least one other developed using a taxonomy as the backplane for connecting models. Validation is difficult and causal relationships are

almost impossible to confirm. Without known rules for combining model outputs, these frameworks are of limited utility.

e. Research Thrusts

Interdisciplinary social science research is needed to establish rules for knitting together results of various branches of research. Research methodologies that combine deductive and inductive approaches are often most productive; therefore, as a companion to investment in interdisciplinary, social-science theory, development of a "laboratory" for experimentation with various multi-dimensional model frameworks could provide feedback for the development of theory. The laboratory must be in the hands of social scientists with computational scientists as assistants rather than drivers.

Various computational models are often used with statistical data that should be available to the end user, both research and operational. An updated set of statistical processing routines should be delivered to the analysis group working for the end user. If there is no such updated set available, an investment should be made in having one developed for the non-expert user.

5. New Formal Models and Tools

Formal models are critical to our ability to think through complex situations. They assist in making sense of large amounts of data. They help us understand the effect of missing data, and they can enable us to test the validity of our initial assumptions. Without benefit of formal models, each analyst and decision-maker enters into the discussion with internal biases, impressions, and assumptions hidden. It is not that the individual has any malice in withholding this information; rather he is not forced to search his own mind to understand his biases and assumptions and make them explicit. The process of uncovering hidden assumptions and individual biases is difficult, in part because they are built up over a number of years on the basis of individual experiences and interactions. Frameworks that challenge the individual to search for hidden assumptions and biases are essential if we are to make better decisions on how to work with and influence diverse groups from different cultures.

One useful framework is to use a typology (preferably a taxonomy or ontology) to examine the population with all its factions and influences. A recent study developed typologies for deterring non-state actors [14]. It incorporated typologies into a tool that leads the user through the process of understanding the questions that must be asked and the data needed to formulate a deterrence strategy. The tool is named DAPSE,

Deterrence Analysis and Planning Synthetic Environment, and in it is the basis for prompting an exploration of assumptions and known information about a society or group.

A taxonomy can be pictured as a hierarchical, connected set of attributes. The taxonomy for examining a society or culture would be large, containing many layers of increasing detail—a daunting list of required data for the analyst. However, few problems require all the data. Research aimed at highlighting the data essential for several categories of militarily relevant problems could help streamline the data collection and analysis effort for a specific problem. Such a tool, if developed and applied reliably to a comprehensive taxonomy would enable the analyst to annotate the existing data and earmark missing pieces. This type of systematic approach to problem solving would help avoid the shortcuts in data acquisition that result from hidden assumptions and biases.

The multi-stage tool described above would assist in gathering the appropriate data, but it would not offer potential courses of action. One way of specifying a course of action is with a hypothesis—if we do this, then that will happen. Looking at a course of action in terms of several hypotheses and rearranging the selected pieces of the typology to support or contradict the hypotheses, now in the form of clusters of data, provides a means of examining the adequacy and quality of data supporting each potential course of action. By laying out choices and evidence in this fashion, the analyst develops a more robust framework for evaluating choices even when they are counter-intuitive (or contradict hidden assumptions or biases).

Of course, this type of analysis presumes the existence of a method for evaluating data or evidence. A number of such methods exist, but additional research is required to assess the most applicable of these and to craft them into tools that users (not experts) could readily employ. An in-depth, comparative study is needed of some of these methods including Bayesian analysis, analysis of competing hypotheses, analysis of non-competing hypotheses, agent-based evidence marshalling and other forms of assessing credibility of evidence. A toolkit of methods and guidance of when to use one over another would be appropriate.

None of the above research addresses computational social science models. Such models are needed, but they are in their formative years. Additional maturation under existing DoD research programs is needed prior to advising their operational use. The substitution of mature, capable social network models for the currently popular link

analysis is, however, one step that could be taken in the immediate future. The strong mathematical basis for true social network models provides additional analytic capability not found in link analysis methods.

6. Interactive Training Techniques

The Services' training has traditionally focused on teaching individuals and groups how to perform tasks. Training has also evolved to prepare individuals to make decisions and act under conditions of uncertainty. Today the missions are changing. The role of social science in these missions is being asserted if not fully explored and the ability to collaborate across cultural divides is demanded—whether those cultural divides exist between agencies or nations.

A gap exists in the preparation of our military when the human dimension is included in operational planning, intelligence preparation of the operational environment, creation of effective strategies and coalitions for nation-building, and preparation for deployment. Of the areas being targeted for training at this point, it appears that only the USMC has distinguished among the various types of training needed for the above missions and is designing a coherent and inclusive program. The bulk of the rest of the training is geared to pre-deployment preparation—some minimal language training and introduction to the cultural mores of the area.

Military staffs and decision makers must understand how to gather data and employ social science tools. The training to do this presupposes that careful thought has been given to the type of socio-cultural analyses needed to understand the population at the strategic, operational, and tactical levels. Such analyses tend to be overlooked because they are difficult, but they are nonetheless essential.

Technology has provided new training possibilities; however, many of our trainers were trained in an older technology and have not as yet embraced the full power of participative media. Therefore, we propose the development of a broad range of training capabilities, spanning all relevant missions and focused on the exploitation of interactive technology of all sorts to enable a rapid appreciation of the significance of socio-cultural differences. Components in the training program would include the use of information sources, an understanding and practice in data collection and management, and the use of new analytical tools including culturally aware models.

Immersive experiences often deliver effective and memorable training. When the term "immersive" is used, it is assumed to refer to interactive games; however, with

today's technology, a game is not the only choice and in fact may be a poor venue for delivering the training. Scenario-based gaming employed without benefit of a great deal of technology delivers an immersive environment through the role-playing of the individuals involved. Group-based experiences are useful for planning staffs, for small combats units about to deploy to a foreign country, and for interagency partners about to engage in a new environment. In some cases, a computer-based game or environment can add to the sense of reality in the scenario or be used to compute the result of the group's interactions and decisions.

Some existing games can be modified to assist the student in understanding influence operations. "A Force More Powerful" [6] is a game developed to teach non-violent methods for groups who wish to engage in peaceful protest and civil influence operations. The game uses local demographics and provides insight into how to examine socio-political issues and gain an understanding of information gaps, use of resources, and the effects of uncertainties in assessments.

Participative media and augmented reality are often used to refer to a learning environment constructed to mimic the student's actual working environment. This technology is most useful where the student uses computer-based tools to solve problems or analyze situations. Scenarios built into these environments encourage the student to engage in his normal work patterns. The software monitors the student's activity and provides individual feedback to improve the individual's performance. Knowledge gained in these environments transfers directly to the student's normal work environment. This technology could be used to introduce the military user to taxonomy, analysis, or modeling tools.

The theme of learning was woven throughout this chapter. Any new form of knowledge or capability must be taught if it is to be used well. Any new tool developed to help the user acquire and employ socio-cultural data must have a training program associated with it. Training in appropriate social science understanding at every phase of the military career is essential if we are to become successful in understanding and influencing the population.

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[6] A Force More Powerful was developed by the International Center on Nonviolent Conflict, media firm York Zimmerman, Inc., and game designers at BreakAway, Ltd.

E. CONCLUSIONS

The capabilities and associated S&T thrusts explored in this document are based on the premise that the ability to work with the local population and the HNG is critical to success in many aspects of irregular warfare. This is particularly important for countering insurgencies and building a foundation for long-term stability. The four capabilities cited:

- Improved methodologies for assessing the population's attitudes
- Data to objectively assess public services provided by the HNG
- Models and tools for influencing the population's attitudes and actions
- Forward headquarters and units with reach-back to these methodologies, data models, and tools

are directed toward creating a clear understanding of the population and capabilities of the HNG and putting that understanding at the service of military decision makers.

Science and technology has much to contribute in supporting these capabilities. The specific thrusts examined in this document represent a focused subset, not a comprehensive list. The focus is on the S&T efforts that

- Provide the infrastructure for storing, managing, manipulating, and sharing data and information
- Enable the rapid acquisition of multi-source, multi-lingual information
- Assist in the collection and integration of structured data from multiple, diverse sources
- Develop the means for semi-automation of the human-intensive process of reducing unstructured, media information into machine-usable structured data
- Support the formation of federated, information-sharing capabilities within DoD and externally with other agencies, coalition partners, and any who can contribute expertise in support of the capabilities
- Develop robust theoretical models and frameworks for reasoning about and modeling the full spectrum of human activities central to understanding and working with all populations, particularly those with non-western value systems
- Provide a multi-disciplinary laboratory for exploring both data-driven and theory-based modeling frameworks
- Work with the communities of interest that form around the information-sharing federation to broaden the scope of understanding and applicability of

data and tools to address national security problems effectively in an interagency context.

While pointed along common vectors, the S&T thrusts themselves are multi-disciplinary, ranging from social science to computer science, and include every category from basic research to prototypes involving existing technology. As a move toward implementation, the next section categorizes the S&T thrusts as near-, mid-, and long-term efforts. Short-term efforts could be begun now and produce results in 12-18 months. Mid-term efforts require more time to mature. Long-term efforts either require considerable basic research or involve socialization across a diverse community before they can be implemented.

Many of the S&T efforts can be leveraged with collaborating research sponsors. The temptation is to sponsor only the short-term efforts; however, initiating the mid- and long-term work with the right research partners is critical to providing needed operational capability. As shown at the beginning of the chapter, Table 1 contains a summary of the S&T technologies.

The art of influencing the population depends on our understanding of the population, its complexity, and the cultural roots that frame their actions, aspirations, and social structures. Needs voiced by battlefield commanders, by study groups in OSD [15-18] and by members of the National Academy of Sciences have all stressed the need for scientific research and technology development in the area of understanding and framing human behavior in its full socio-cultural context. While this chapter views the science and technology needs from one perspective, the research thrusts identified are consistent with and echo the critical needs that have been raised across the DoD The ability to understand, influence, and work with populations and their social structures is vital in both preventing and resolving armed crises. The importance of research in understanding human dynamics cannot be underestimated and deserves long-term investment, not merely near-term, crisis-motivated attention.

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Annex A

A TYPOLOGY FOR UNDERSTANDING THE POPULATION AS AN ACTOR

Annex A
A TYPOLOGY FOR UNDERSTANDING THE POPULATION AS AN ACTOR

IDENTIFYING THE ACTOR

- Who is the actor?
  - What are the factors to influence the actor with reference to the current issue?
  - Are there issues in the physical environment that would affect the actor's decisions in this case?
  - Are there cultural factors that would drive the actor's perspectives?
  - Are there influential people who would guide the actor's decision process?
- Are there several actors or factions involved?
- Are there distinct differences between or among the factors that would affect their response to U.S. overtures?
- Are there common channels of communication or does mutual distrust create different belief networks among the different groups?

RELATIONSHIPS AMONG THE ACTORS AND THE GOVERNMENT

- Is the host government representative of the population?
  - How much influence does it have over the populace?
  - Does it respond to the population or to other influences?
- Who provides the local security?
  - Does this group belong to the official government (police, army) or is it an insurgent or other faction?
- Is there current conflict?
  - Are there clear divisions between the groups in conflict?
  - Are they overt and recognizable?

  - Are the insurgents foreign or local?
- Are there clear divisions among the population?
  - Ethnically based?
  - Based on religion?
  - Based on economic status?
  - How long is the history of division? This is a very significant factor in many regions of the world and we in the United States do not recognize its importance

THE ACTOR AS A DECISION-MAKER

Demographics

- Ethnicity: Gives insights into values, trust networks, and potential friction points.
- Age distribution: Has the population undergone some stress that has created gaps or "bulges?" If there is a war or insurgency, there may be an unnatural absence of men of fighting age, for example.
- Major experiences that would shape or define the population group: Persecution, a history of hostility with another faction, repression, experience of self-rule or lack thereof, etc.
- Occupational history: Is this an agrarian group, merchant class, current or former ruling class, is it professional or blue collar (western mirroring)?
- Expertise: Are the people educated and to what level, is there technical expertise or some significant skill base now or in the recent history of the group?

Characteristics of the Group Based on Past Observation

- Network of influential others: Are there people who are known to influence this group—could be endogenous influences as well?
- Does the group have a recognizable personality: Prone to violence, non-communicative, etc.?
- Who/what has influenced the group in the past?

Negotiation Space

- What does the group really want: Remembering that what is asked for and what is really desired may not be the same, at least at first blush.
- What are they willing to give up for it?
- What are they not willing to give up?

Ideology as a Unifying or Identifying Factor

- Do communications give evidence to ideology as important to the group
- Do communications express a similar interpretation of that ideology
- Does the group use ideology to justify its decisions and behaviors
- Is ideology the basis for membership in the group
- Is the group homogeneous or is diversity accepted
- Is the group defined by a single issue or a small number of issues
- Has the group recently experienced common, threatening events – the type of events that would build a sense of a common fate or common enemy
- How long has the group existed as an identifiable entity

Embeddedness

- To what degree do the members depend upon each other for important needs (survival, security, companionship, access to mates or jobs or land, etc.)
- Responsibilities in the group to other members (can be anything from prestige to connections, finances, education, requirements of daily life, etc)

Stress and Time Pressures

- How has the group responded to time constraints, crises, emergencies?
- Is it necessary to develop a sense of emergency to get the group to come to decision?
- Has the group been subjected to threatening situations or an environment of fear?
- Is their current behavior characteristic of living in fear or is it their norm?
- Are there signs of internal strife or conflict within the group?

Culture

- Is the culture individualist or collectivist?
  - What is the core of the collective unit (family, cell, etc.)?
- Is the culture power-oriented or egalitarian?
  - Is there a rigid authority structure?
  - Is diversity of opinion tolerated?
- What is the primary driver of the cultural norms (honor and shame, guilt avoidance, revenge, etc.)?
- How does the group react to outcomes of strife—to gain and loss?
  - What types of actions are taken to recover or reclaim something of value to the group, something closely related to the group identity?
  - What position does the group have in the socio-economic hierarchy, and is that closely tied to the group's identity?

Source of the Leader's Strength and Control

- Charismatic personality (ability to sway the masses).
- Position of wealth or hierarchy in the group (positional influence, capability to buy off opposition, position of honor, etc.).
- Control of critical resources (military force, weapons, economic power, owns important resources, controls information).

DECISION-MAKING PROCESS AND STYLE

Who Decides?

Formal Leader

- Political structure or law establishes the authority of the leader to act unilaterally.
- This leader has shown past ability to exercise authority and act unilaterally.
- This leader's past decisions have been implemented.
- There is internal and/or external recognition of this leader's authority.

Informal Leader

- This leader has shown past ability to exercise authority and act unilaterally.

- This leader's past decisions have been implemented.
- There is internal and/or external recognition of this leader's authority.
- But, this leader has no formal, state-sanctioned authority.

Group with a Single Perspective or Ideology

- The group's formal communications attribute key executive decisions to the group as a whole.
- The group is authoritative in that its decisions are implemented.
- Statements from the group communicate a single perspective or ideology.

Group with Multiple Perspectives or Ideology

- The group's formal communications attribute key executive decisions to the group as a whole.
- Statements from the group communicate a single perspective or ideology.
- Statements from group members communicate dissenting opinions or perspectives.

Group with Subgroups

- Formal documents or rules divide (not delegate) decision-making authority among subgroups (similar to the division of the U.S. Government into three parts: executive, legislative, and judicial).
- Decision-making procedures follow rules that specify multiple decision-making subgroups.
- Subgroups issue decisions on their own.
- Disagreements among subgroups are accepted or tolerated.

Coalitions

- The group is heterogeneous.
- Members must be capable of operating independently.
- Members can have very different governance systems from those governing the coalition.
- The group is primarily voluntary and temporary.

Decision-Making Styles

Rational

This approach is normally associated with the application of a clear, cost-benefit analysis approach.

- Evidence that there are multiple inputs used in the decision process.
- The decision maker has given evidence of using a deliberative style.
- There is evidence that the leader has sought considerable information prior to making the decision.

Heuristic

This is likely to be a primary mode used by the populace. The decision maker may well be rational, but, in understanding the nature of his constituency, may choose to express his decision heuristically. The heuristic decision-maker follows pre-defined or accepted norms. The totality of a complex decision could be expressed as a slogan or mantra that is easily communicated and contains simple references to unstated principles or values.

- Leaders may resort to heuristics when there is limited time to make a decision (note that it is possible to force a decision-maker into this mode by imposing stress or time constraints).
- Leader has already committed himself to the decision through prior public commitment (promises made, resources committed).
- Leader has a history of actions base on strong stereotypes.
- Leader may have either a lack of information or too much data to process.
- Leader may attach great importance to symbols and symbolic acts or statements.
- Leader my rely on cultural or religious norms or make a show of doing so.

Sense-Making

This mode of decision making is often invoked where there is uncertainty. When engaged in sense-making, a decision maker may choose to probe the environment and make adjustments to his approach based on the response received in the same way a fighter will feint as a means of testing his opponent.

- Leader is in a crisis situation and has no time or resources to collect sufficient data for a rational process.
- Leader may be dealing with new demographics or a change in the environment.
- Leader may be responding to the emergence of a new or different crisis.
- Leader may give evidence of the stress caused by uncertainty in the content or emotional delivery of speeches.

Reliance on Subject Matter Experts

There may be a person or group that the leader consults before making a decision. He may have a favored science advisor who would be consulted only for technical matters or perhaps there is a senior statesman and predecessor who is generally consulted. The decision making become "expert" in nature when the word of the expert is clearly taken as final.

- There is evidence of advisors and/or authority figures present during decision-making situations.
- There is a highly differentiated governance structure in which an expert team is explicitly designated.
- The nature of the decision is highly complex and sufficiently diverse as to require expert opinion.
- There is evidence of a leader's inexperience or lack of expertise with a particular decision or activity.

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III. UNITY OF EFFORT IN CIVILIAN-MILITARY ACTIONS

Summary

Unity of effort (UoE) is the coordination and cooperation that binds participants in complex efforts toward common objectives and results in more effective action and better outcomes. Achieving UoE within the U.S. Government in order to integrate the military instrument with other elements of national power has proven difficult enough. However, the challenge of UoE extends beyond U.S. interagency operations to include coalition partners, inter-governmental organizations (IGOs), non-governmental organizations (NGOs), private commercial interests, elements of a HNG, and centers of influence in the local population. Particularly in irregular warfare and counterinsurgency operations, unity of effort with the HNG and population is critical to successful stabilization and transition. This report identifies capabilities for improving UoE to help direct S&T investment.

For the U.S. military to enter a unified action and assume a lead role to direct actions of other participants would be counter-productive in most instances. The appropriate role for the military, as leader or supporting actor, in any specific unified action will depend on the action's primary objectives and the nature of the operational environment. Similarly, the DoD must seek a balance between leading in the development of capabilities for UoE (where needed) and adopting the approach of other agencies that may already have accepted standards, methods, or technologies (wherever appropriate). Many capabilities identified here already exist, at least in some limited form, within the United Nations or international humanitarian and disaster response communities.

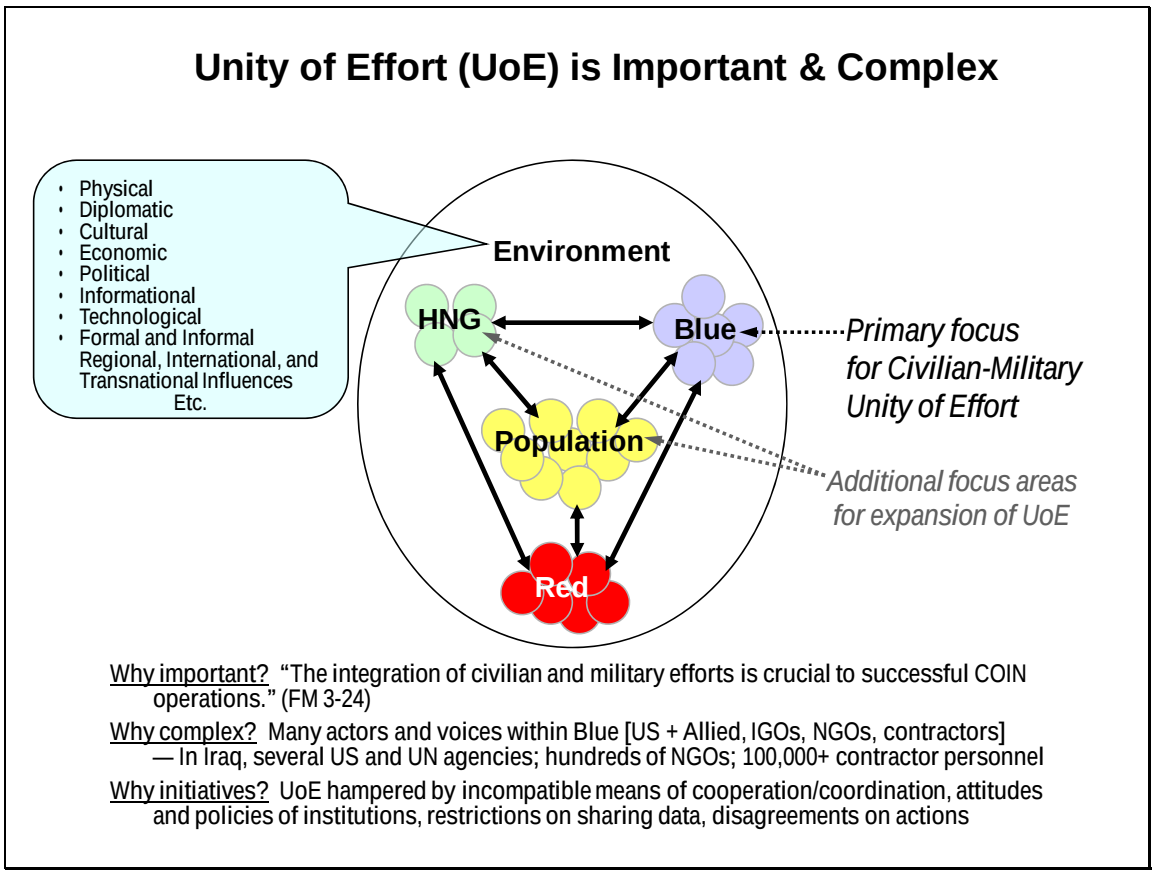
We developed a mental model of relationships across a network of organizations and provide a framework for understanding challenges in coordination and cooperation and the resulting implications for UoE. The model can be applied when building a network of participants for a specific unified effort, as a diagnostic tool and checklist to identify sources of problems in coordination and cooperation, or as a framework for case studies of past unified efforts to identify lessons that need to be learned. We then built on the mental model to develop and describe 3 essential functions of UoE for any mission and identify 16 needed capabilities:

- Essential Function #1: Identify Resources and Involve Key Participants
  1. Advertise and Recruit
  2. Map Organizational Networks
  3. Monitor Open Source Information
  4. Negotiate Collaboration
  5. Survey and Poll Participants
  6. Track Individuals and Groups

- Essential Function #2: Provide Means and Processes for Coordination
  7. Access Networks Remotely
  8. Automate Information Controls
  9. Provide Virtual Collaboration
  10. Publish and Notify
  11. Route Communications
  12. Shape Organizational Networks
  13. Verify Identity Remotely

- Essential Function #3: Monitor, Assess, and Aid in Cooperation
  14. Provide Compatible Messages to Population
  15. Measure Success of Collaboration
  16. Model the Organizational Network
      (also 5. Survey and Poll Participants, 6. Track Individuals and Groups, and 13. Verify Identity Remotely).

The results of this work could be taken in several directions, and the capabilities identified could be considered by a joint panel of practitioners of UoE and research partners to identify enabling technology initiatives. The capabilities and organizational network model could also be applied to real examples of civilian-military unified action as the basis for case studies to identify successes and shortfalls of UoE in recent operations. Finally, the work documented here could be further extended to a detailed treatment of each of the identified capabilities with an assessment of their relative priority.



A. ASPECTS OF UNITY OF EFFORT

1. Its Role within Irregular Warfare

The collective of Blue actors, as represented by the clusters in the structure of IW above, contains many distinct participants including U.S. military and civilian organizations, coalition partners, IGOs, NGOs, their contractors, and private commercial interests with a stake in the region. Although each participant contributes in their own way to achieving security, consolidation, and transition to a legitimate and stable HNG, each participant does so according to their own means, principles, and agenda.

UoE is that coordination and cooperation that binds participants together toward common objectives, resulting in more effective action and better outcomes. Appropriate analogies are sports teams and combat units, which gain or lose a competitive advantage according to the degree that individual members can learn to play or fight as a team. However, sports teams and combat units operate under a unity of command, a situation generally not possible for the integration of civilian units and military efforts that are the subject of this chapter.

The cohesion of action and purpose among Blue elements that is the goal of UoE is recognized as being essential for IW, and particularly counterinsurgency (COIN) operations. From FM 3-24/MCWP 3-33.5, Counterinsurgency: "The integration of civilian and military efforts is crucial to successful COIN operations.... Achieving unity of effort is the goal of command and support relationships. All organizations contributing to a COIN operation should strive, or be persuaded to strive, for maximum unity of effort."[1]

The principle of UoE can be further extended, beyond the scope of Blue, to include additional actors who have objectives in common with Blue or would benefit from the realization of Blue's objectives. Such actors from the HNG and within the population may include civil authorities, military and paramilitary units, security forces, local businesses, and social organizations.[2] An effort to enlighten these actors to advantages derived from actively supporting Blue could bring the advantages of UoE: bringing their individual goals into alignment with the larger common objective and focusing their efforts on activities that profit one another and the "Blue team."

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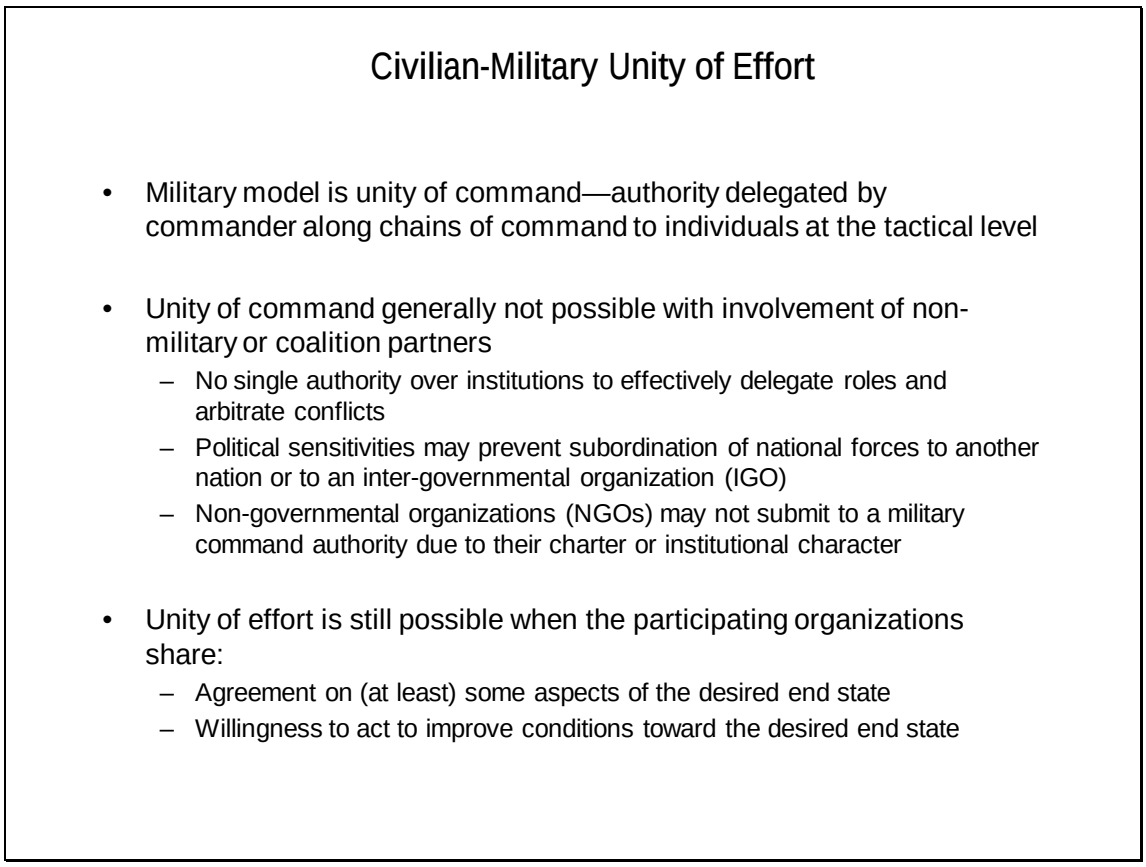
1 From paragraphs 2-2 and 2-13 of FM 3-24/MCWP 3-33.5, *Counterinsurgency*, Headquarters, Department of the Army, December 2006, Unclassified.

2 Social organizations themselves comprise a diverse spectrum and may be organized based upon religious, cultural, tribal, ethnic, economic, professional, or community interests.



2. Description

The definition of UoE appearing in JP 1-02 is: "Coordination and cooperation toward common objectives, even if the participants are not necessarily part of the same command or organization—the product of successful unified action."[3]

The military model for coordination is unity of command, in which authority is delegated from a single commander responsible for military operations within a theater down along chains of command to individuals at the tactical level. However unity of command is not possible in those endeavors involving non-military or even coalition military partners. In such cases, no single authority directs the activities of all participants. Such cases may arise when:

- A single authority with control over both organizations may be too far removed from daily operations on the ground to effectively delegate roles and

[3] *DOD Dictionary of Military and Associated Terms*, Joint Publication 1-02, as amended through 26 August 2008, Unclassified

arbitrate conflicts of command as they arise, for instance between U.S. Departments of Defense and State.

- Political sensitivities may prevent nations from allowing their forces to be subordinate to the command of another nation's forces or to control by an IGO.
- In the private sector, many NGOs are incapable of recognizing or responding to military command authority because of their charter or institutional character.

A lack of the formal structure associated with unity of command does not preclude less formal arrangements among organizations to provide the coordination and cooperation necessary to function as a team. In principle, the only requirements are for participating organizations to (1) share agreement on some aspects of the desired end state such that they are not working at cross purposes by design and (2) be willing to act in the environment to improve conditions toward the desired end state.

In practice, achieving UoE is difficult and requires capabilities for understanding and shaping the relationships among all of the participating organizations, for enhancing coordination through information sharing, and for improving cooperation through active monitoring and assistance of one another. This chapter presents an exploratory look to understand challenges in building civilian-military UoE and to identify needed capabilities.

Benefits of Unity of Effort

- In some cases UoE is essential to mission success
  - Missions requiring capabilities that can only be achieved through interdependence among participating organizations
- In other cases improving UoE reduces time required, costs, and risks to achieve the goals of participating organizations through better cooperation and coordination among participants
  - Reduce the likelihood of Blue-on-Blue interference
  - Reduce work at crossed purposes
  - Lower the amount of duplication of effort
  - Provide a better match of resources to needs
- Finally, UoE can have ancillary benefits aside from those measured in terms of success of the primary mission
  - Better situational awareness through sharing of observations
  - UoE can generate "unity of message" relayed to the population
  - Progress toward UoE in one theater and mission can foster a community mentality toward future problems in civilian-military unified action
    - UoE will have to be "grown'"over a series of endeavors

3. Benefits

UoE can benefit Blue in many ways from directly enabling mission-critical capabilities, to improving effectiveness and efficiencies, to indirect benefits that support secondary objectives or help build capabilities for future missions. The primary benefit is providing participating organizations the means to plan and act interdependently, leveraging one another's resources and strengths to realize capabilities that no organization acting alone could achieve. For some missions, these unified, interdependent capabilities may be essential to reach the desired outcome.

Furthermore, UoE can improve mission performance through coordination and cooperation to avoid wasted effort and resources. Deconflicting activities across participating organizations will reduce the work being conducted at crossed purposes and the potential for Blue-on-Blue interference (or fratricide). Coordinated planning will reduce duplication of effort through assignment of areas of responsibility to individual organizations or teams. Also, by identifying total resources available and total needs throughout the region, integrated planning for participating organizations can find a better match of resources to needs than would be possible with ad hoc organizing. These types

of benefits from UoE in planning and organizing help to reduce the costs, risks, and time required to achieve the common goals of the participating organizations.

Finally, UoE offers additional ancillary benefits to the participants that can have positive effects aside from success of the primary mission. By sharing data about the environment, HNG, and population, all of the participants that make up Blue will benefit from better situational awareness regarding attitudes and events in the region. By adopting a shared, common statement of purpose for the endeavor of complex Blue, the participating organizations are better able to communicate a consistent message to the population and HNG concerning Blue's intentions—instead of multiple conflicting messages driven by the visions of fully independent actors. Through the practice of UoE capabilities, organizations will get better at partnering, coordinating, and cooperating. Success in unified action will beget greater UoE in later endeavors and contribute to growth of a community mentality. Over time this sense of belonging to a community of organizations acting for the benefit of all will begin to change organizational cultures that obstruct UoE today.

Factors Affecting Unity of Effort

- Missions Enabled through Civilian-Military Cooperation and Coordination:
  - For example, stability ops, reconstruction, peacekeeping, humanitarian relief
  - Requires diversity of skills across participating organizations for success
  - Affects whether military or civilian organizations should take a lead role in organizing and providing resources for cooperation and coordination
- Operational Environment:
  - For example, major combat operations, contested region, stable & secure region
  - Affects the level of control by military forces over access to the region and the movement of civilian organizations within the region
  - Drives the reliance of civilian organizations upon military forces for protection, security, escort, and rescue
- Diversity of Participants:
  - Joint: U.S. military forces and DoD contractors only
  - Inter-agency: U.S. Government agencies (military and civilian) only
  - Host-nation and multinational: multiple governments and IGOs represented
  - Multilateral: also including private organizations (non-profits, businesses, or social organizations) operating without official government status

Joint, Inter-Agency, Multinational, Multilateral (JIMM) is the most challenging context for achieving UoE through cooperation and coordination

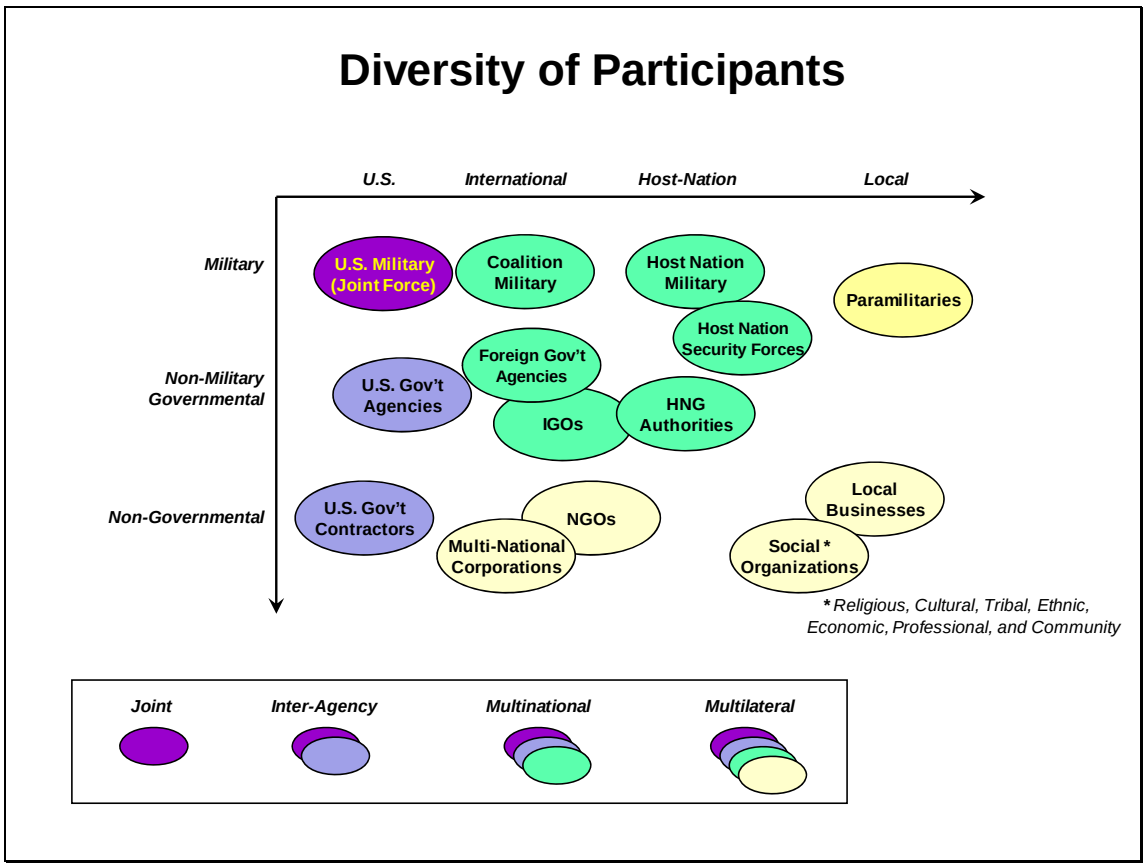
4. Factors of Influence

Three principal factors affect the type and qualities of UoE that can be achieved in a particular instance. The first is the mission or objective to be accomplished through civilian-military unified action. The commitment among mission partners and diversity of skills and resources required for the mission will determine the variety and composition of organizations that need to be brought into complex Blue to achieve mission success. The nature of the primary mission will suggest what type of organization (military, civilian, or even private) will be best suited to take a leading role in directing and organizing the coordination of participants. As we discuss later, several alternative architectures for coordination are possible. The most appropriate coordination architecture will depend on the breadth and scope of organizations participating in complex Blue and the organization (or organizations) that takes the lead role in providing the means for coordination.

The second factor relates to how permissive or contested the operational environment is. The more violent the operational environment is, the more likely military organizations will control access to and movement about the region. A violent

operational environment will also drive civilian participants to rely on military partners for protection, security, escort, and rescue. Both of these factors give the military leverage to control the terms of participation during civilian-military unified action in violently contested areas by placing conditions on access to the region or on provision of security. In contrast, during operations in stable and secure areas, civilian or HNG leadership will normally have discretion to include or exclude military involvement in the endeavor.

The final factor, not independent of the prior two, is the diversity of organizations that participate in complex Blue. The organizations can be drawn from relatively homogeneous communities, such as only U.S. military or only IGOs, or can include all varieties of organizations: military and civilian, U.S. and foreign, governmental and private. Generally speaking, the larger and more complex a community the participants form, the greater are the challenges and obstacles that must be overcome to realize the benefits of UoE.



The graphic above represents the potential diversity of participants on two axes and groups them into four categories:

- Joint: for U.S. military forces and DoD contractors
- Interagency: for all U.S. Government agencies, military or civilian
- Multi-national: for military and civilian organizations of the HNG, IGOs, and coalition partners
- Multilateral: for private organizations including NGOs, businesses, social organizations, and perhaps paramilitary organizations

The most challenging context for achieving UoE through cooperation and coordination is the Joint, Interagency, Multi-national, and Multilateral (JIMM) environment.

Obstructions to Cooperation & Coordination

- Philosophies antagonistic to cooperation and coordination
  - Institutional desire to remain unaffiliated, e.g., anecdotal stories that certain aid organizations will not enter a facility with a uniformed military presence
  - Institutional need to preserve ideological or philosophical independence
  - Simple distrust of motivations or methods of dissimilar organizations
- Policies antagonistic to cooperation and coordination
  - Security or classification restrictions that prevent sharing plans or information
  - Intellectual property rights and ownership of data, i.e., the "ORCON mentality"
- Insufficient mechanisms or resources
  - Incompatible network interfaces, data formats, or communications channels; lack of common tools or spaces (real or virtual) for cooperation and coordination activities
  - Lack of means to translate among the terminologies of different communities
  - "...but not on my dime," willingness to cooperate and coordinate in principle but not to incur additional expense to aid other participants or facilitate UoE
- Internal organizational dysfunction, due to poor planning, coordination, or communications within an individual participating organization

Although these participants will agree on some aspects of the desired end state, they will have different agendas, philosophies, and methods. These obstruct agreement on vision for the best outcome, strategies and priorities for change, best or acceptable means for tactical action, and willingness to partner with other organizations from across the spectrum of complex Blue (for instance unwillingness of some NGOs to be affiliated or associated with military organizations).

The greatest challenge to UoE will come from philosophies antagonistic to broad cooperation and coordination. Such philosophies are intended to protect the interests of the organization from compromise by other participants in the action; however, they prioritize an organization's self-interest above success in the common endeavor. Such philosophies are developed internal to an organization and must be addressed by individual organizations internally. To overcome philosophies antagonistic to cooperation will entail changes in the culture of organizations to emphasize "Blue community" involvement over independence and to emphasize value derived from information-sharing over perceived value of control over information.

In contrast to philosophies antagonistic to cooperation and coordination, policies that obstruct UoE are externally imposed through legal requirements or by directive from a parent organization. A recent example is policy that severely restricts discussions between DoD and European Union (EU) staffs because of the U.S. relationship to NATO. This policy makes working with the EU on shared interests and objectives on the African continent difficult or nearly impossible. Overcoming policy impediments to UoE can be accomplished in some cases by petitioning for a change of policy. In other situations, scientific or technological solutions may be required to enable cooperation and coordination activities within constraints imposed by applicable policy.

In the near term, UoE is hampered even among willing participants by insufficient mechanisms, processes, and resources for coordination and cooperation. Many of these problems can be addressed by investment in interoperable information and communications systems and the adoption of common standards for data structures, formats, and protocols. Resources will have to be allocated to resolve the technical issues for key partners and to exercise and practice cooperation and coordination skills. Once key participants have adopted and embraced standards for information and communications systems, other organizations can be persuaded to migrate to those standards.

Even with improved technologies and standards, and even with changes in organizational cultures toward a more Blue-community-oriented mentality, coordination and cooperation will be difficult for some organizations. Some will lack the resources to buy interoperable equipment. Some will be victims of their own internal dysfunction and unable to plan and coordinate their own activities effectively. Results of efforts to improve UoE will be uneven.

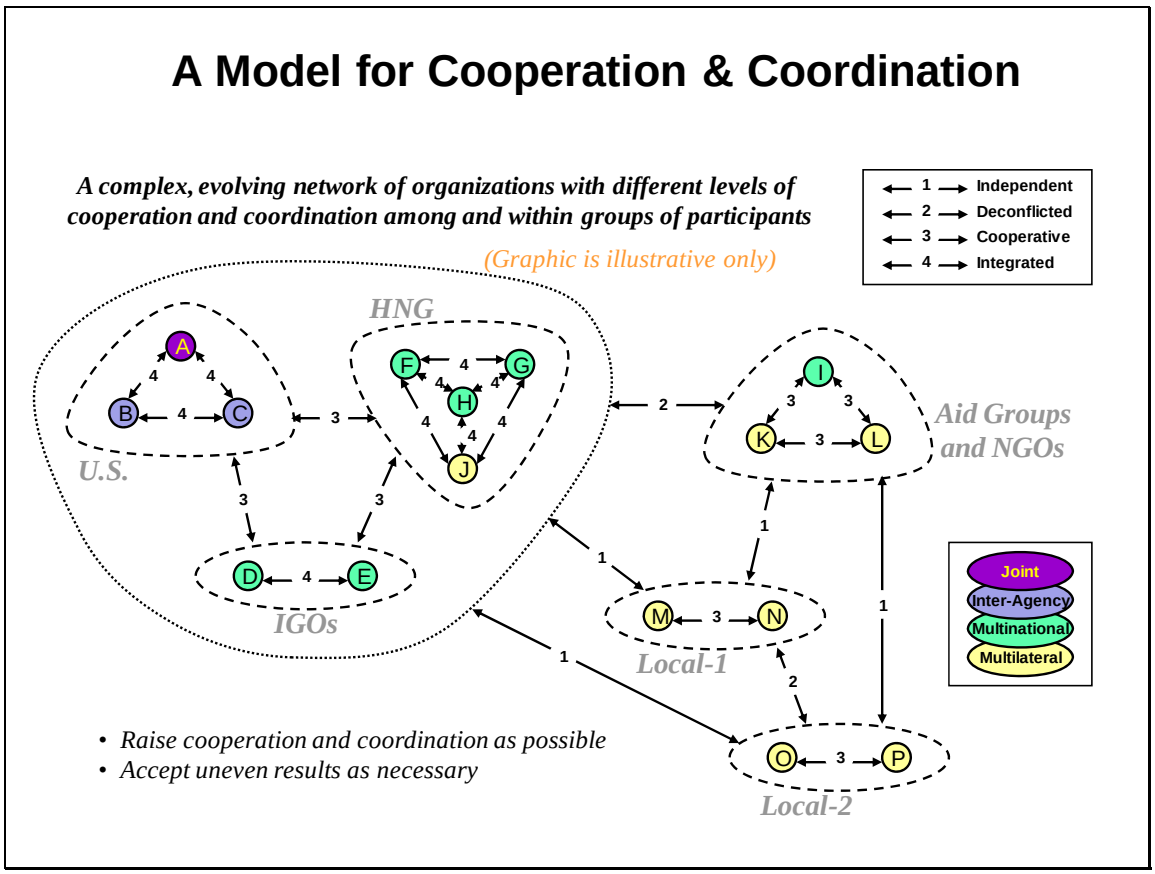
Relationships of Cooperation & Coordination

- Progressive levels of cooperation and coordination are possible
  1. **Independent**—No cooperation or coordination occurs. Each organization plans and executes its activities without regard to others.
  2. **Deconflicted**—Organizations plan and act individually (no cooperation) but coordinate checks to avoid interfering with one another, based upon either a division of responsibilities or separation by location or time of activity.
  3. **Cooperative**—Organizations coordinate planning and execution to leverage the strengths of each other and achieve an improved allocation of effort.
  4. **Integrated and Interdependent**—Organizations effectively plan and execute activities as a single unit, with each supporting and assuming support from the other. Distinctions between individual organizations become blurred and operationally insignificant.
- The means of improving UoE is raising the level of cooperation and coordination as possible (from 1 to 4)
  - From a UoE perspective, the "Gold Standard" for cooperation and coordination is all participants acting together as a single integrated and interdependent whole, i.e., "Level-4"

5. A Model for Relationships Among Organizations

A simple mental model of the diversity of participants and the relationships among them can help to understand challenges in coordination and cooperation and the resulting implications for UoE. The model proposed here consists of two conceptual elements: (1) a ranking of levels of coordination and cooperation and (2) a representation of participating organizations as a network of participants.

The progressive levels of cooperation and coordination are enumerated on the chart above. At the lowest level, organizations act independently neither coordinating their activities nor intentionally obstructing one another. As the level of coordination rises, organizations attempt to avoid interference, then work together to leverage one another's strengths, and finally plan and act effectively as a single unit. For each pair of organizations in complex Blue, a level from this simple scheme can be assigned to characterize the nature of their coordination and cooperation.



The second element of the model shows the relationships among the participants as a network of bilateral relationships of coordination and cooperation. Each individual organization participating in the endeavor is represented as a node in the network, and the relationships between each pair are represented as links between nodes labeled with the level of coordination and cooperation between the pair.

In this simple model, at the highest level of coordination and cooperation, clusters of organizations will form as enclaves of trust within the larger network of participants. Dropping to the next lower level of coordination and cooperation reveals larger less-coordinated clusters at a lower level of mutual trust, and so forth. This network will change over time as participants join and depart the network and as relationships among participants change. The final picture is a complex and evolving network with different time-dependent levels of coordination and cooperation among and within groups of the participants.

The model of the organizational network can assist with understanding how information will flow through the network from one organization to another although there may be no direct ties between the two. The model also indicates the potential for

one organization to exercise influence across the network, indirectly through other participants, to generate leverage over the decisions and plans of another organization. Such leverage can be useful to persuade reticent organizations to participate in more constructive ways than they would otherwise be inclined to do. Understanding and applying simple models of the organizational network can help the Blue community to shape the relationships among participants to achieve greater UoE.

Some limitations of the model just described should be noted. First, most large organizations present multiple public faces and cannot realistically be represented as individual nodes of the network. This first issue is of greatest concern if communications within an organization are poor such that activities with one partner are not shared or correlated with other partners, or if multiple faces of a large organization relate semi-independently with a partner such that, in practice, more than one relationship between the two organizations exists. The second limitation is that relationships are not always mutual and reciprocal; this limitation can be overcome by enriching the characterization of relationships in the model to treat the flow of information and trust in each direction separately. Finally, not all relationships among multiple organizations can be characterized by traits of bilateral relationships between members—some multilateral effects involving agreements between three or more organizations will require a different approach to be represented within the model.

Toward Unity of Effort—A Way Forward

- Obstructions to cooperation and coordination with certain organizations may be insurmountable today
  - Suggests a need to change the current environment and common perceptions about civilian-military UoE
  - Suggests focusing initial efforts on most willing participants
- Bring most willing participants "into the fold" as a seed for UoE
  - "Proof of concept" to demonstrate capabilities and develop technologies
  - Develop advanced understanding of nature of civilian-military relationships and means to leverage shared interests to foster collaboration
  - Demonstrate benefits to all participants in UoE and generate incentives for additional participants to "join the fold"
- Goal of approach is to create a tipping point effect by continually enlarging the network of willing participants, thus affecting a change in perceptions
  - Until perceived benefits of cooperation and coordination outweigh values of contrary philosophies and policies of organizations
  - Until there is a stigma associated with non-participation, rather than stigma associated with affiliation and cooperation with U.S. military

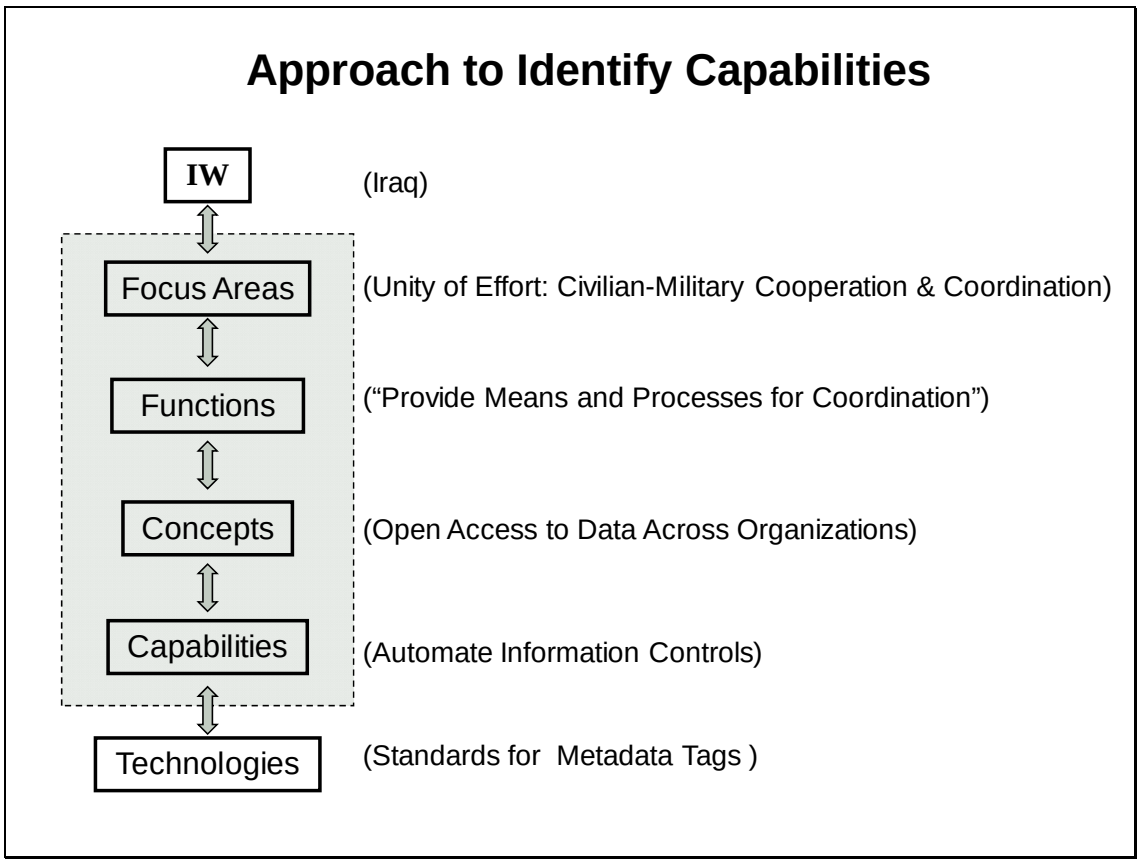
6. A Way Forward

Overcoming the obstacles to coordination and cooperation is complicated by technical and cultural impediments, the diversity of potential participants in complex Blue, and the need for solutions to be rehearsed and practiced to be effective. Among USG organizations, greatly improved UoE can be achieved with presidential leadership and congressionally provided resources; the necessary cultural changes will follow.

Obstructions to UoE with some organizations outside the USG may be insurmountable today due to cultural differences between military participants and civilian groups. To eventually bring them together will require changing the nature of civilian-military interaction and fostering a cooperation-oriented mindset. This section addresses changing the environment of collaboration incrementally by growing capability through outreach to the most willing and able participants initially.

The way forward calls for identifying the best candidates for initial efforts and establishing information-sharing capabilities with them to enhance civilian-military coordination and cooperation. Emphasis is placed on common interests shared by military and civilian partners, and attention is paid to assuring participants see the

benefits of unified action for each of them as technical capabilities are practiced and developed. As the network of trust and information sharing is strengthened, more participants will become willing to join and gain the benefits already demonstrated. The hypothesis is that, once a certain "critical mass" of willing participants have joined, a tipping point will be reached causing a change in the civilian-military environment to stigmatize organizations choosing non-participation in the unified effort.



B. UoE FUNCTIONS, CONCEPTS, AND CAPABILITIES

1. Approach

The focus area discussed in this chapter, civilian-military unity of effort, is connected to specific capabilities by identifying the essential functions that are central to developing UoE, developing concepts or approaches for performing the essential functions, then considering what capabilities are required to make each concept work. This approach results in a number of capabilities for each function and concept developed. The approach stops short of recommending specific technologies for investment in research and development; however, the capabilities are described in sufficient detail that a joint panel of practitioners of UoE and research partners could identify appropriate technology initiatives for exploration.

Essential Functions for Unity of Effort

- "**unity of effort—**Coordination and cooperation toward common objectives, even if the participants are not necessarily part of the same command or organization—the product of successful unified action." *[From JP 1-02, emphasis added]*
- Essential functions for unity of effort:
  - A. Identify Resources and Involve Key **Participants**
    - Assure that all the types of skills, resources, and support needed are available within the spectrum of engaged civilian-military participants
    - Understand and map the nature of relationships among participants, i.e., the organizational network
  - B. Provide Means and Processes for **Coordination**
    - Foster standardized communications, interoperable networks, and collaborative spaces
    - Automate controls on dissemination of data and access to networked resources
    - Leverage relationships among participants to minimize the significance of obstacles to association, coordination, and information sharing, i.e., network shaping
  - C. Monitor, Assess, and Aid in **Cooperation**
    - Monitor activities, resources, current status, and organizational health of participants
    - Develop and assess metrics for coordinated mission performance to identify shortfalls, bottlenecks, and roadblocks to progress
    - Allocate assistance, support, and rescue to organizations and individuals in need

2. Essential Functions

The essential functions of UoE for any mission are (1) building the Blue team, (2) assuring the member organizations can coordinate, and (3) fostering and aiding their mutual cooperation.

a. Identify Resources and Involve Key Participants

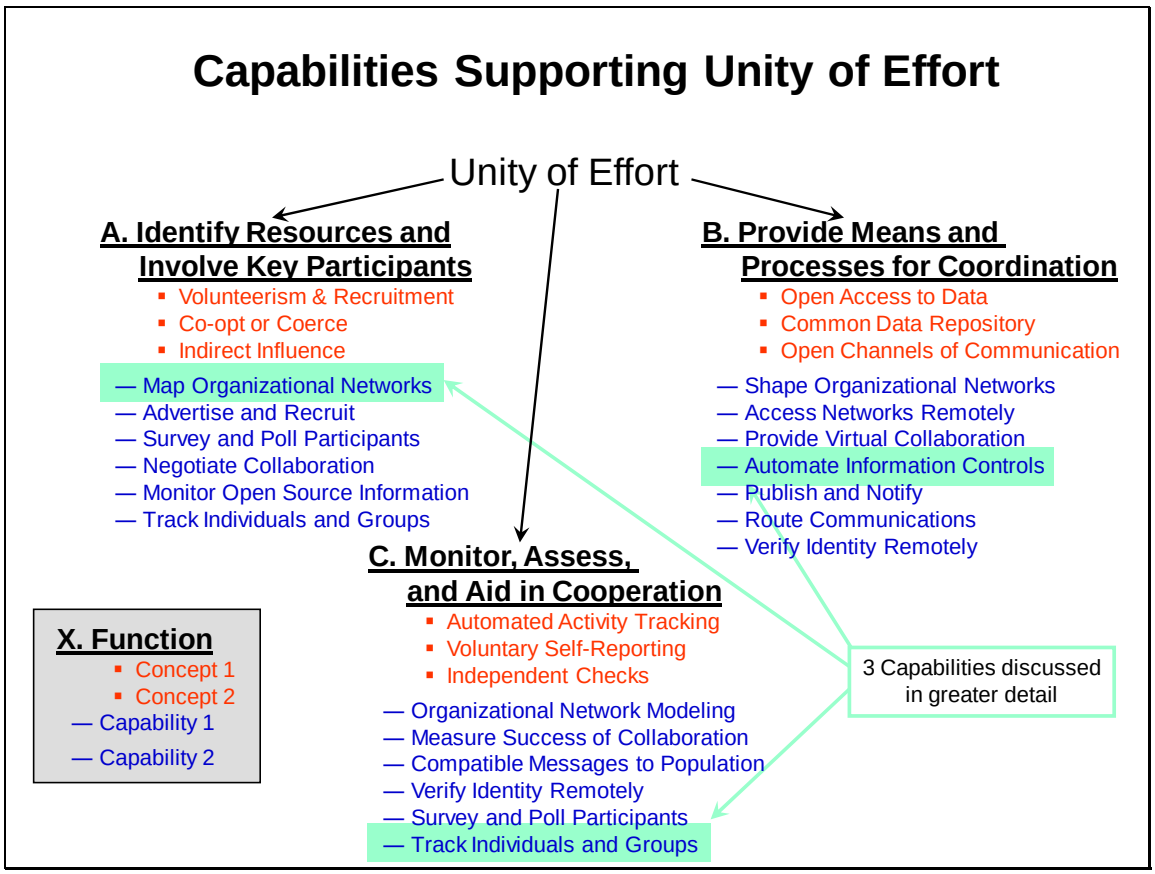
This function includes all capabilities required to identify the types of organizations required, identify organizations with presence in the operational area and organizations that must be brought in from outside, enlist their support in the endeavor, and understand how they will work together. It also covers the ability to discover other non-cooperative organizations acting "for Blue" within the region, identify their motives and objectives, and co-opt them directly or indirectly into participation with the Blue community or otherwise accommodate their activities within the planning of the cooperative organizations.

b. Provide Means and Processes for Coordination

This function addresses how participating organizations can discover and share information across information systems, as needed and appropriate, and coordinate planning and execution of activities. The more confident the organizations are that private data will not be compromised, the more likely they will be to share data that is appropriate for release. The function also includes capabilities necessary to shape the organizational network and flows of information across the network to minimize any obstructions to information-sharing due to technical or cultural issues.

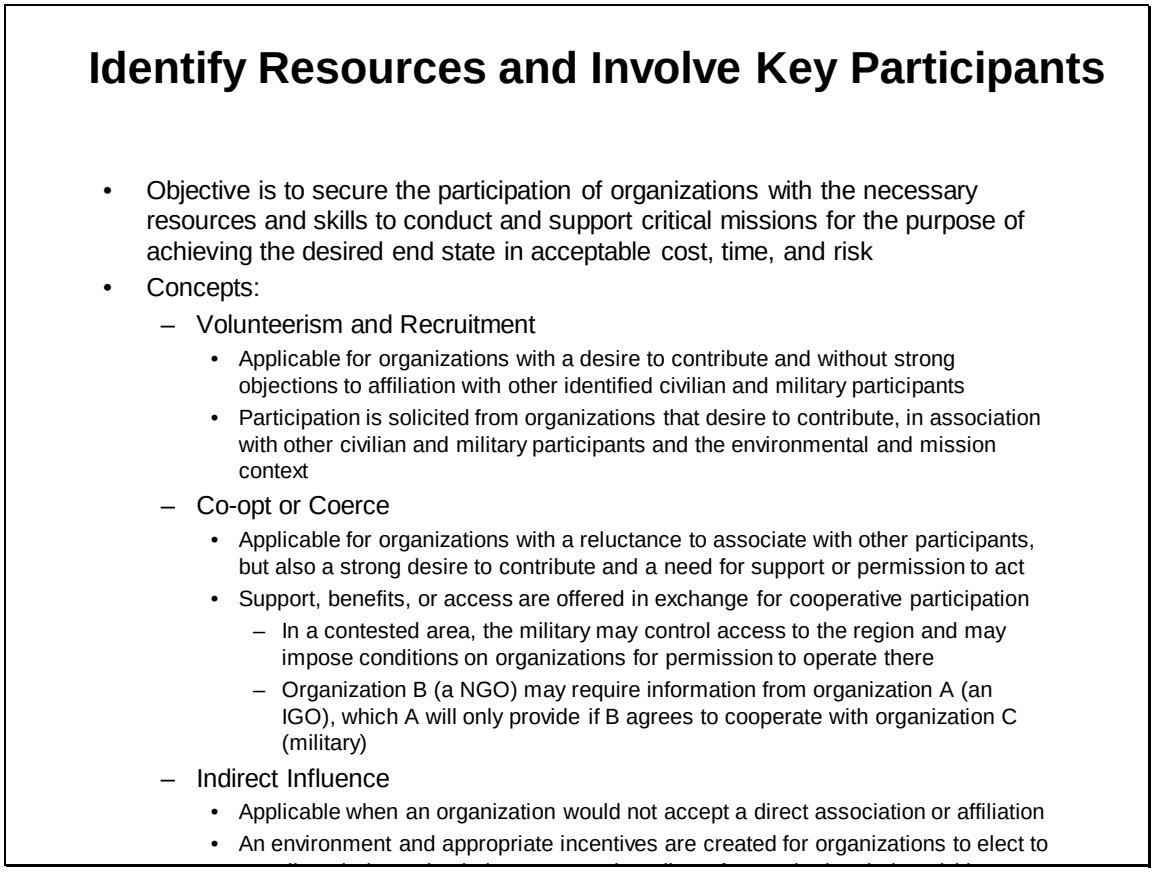
c. Monitor, Assess, and Aid in Cooperation

The function entails activities to match organizations needing aid or assistance with organizations that are capable of helping. Monitoring the activities, resources, and status of teams from various organizations provides data on mission progress and assistance to teams in need of aid. Assessment of mission performance in relation to operational plans is needed to identify shortfalls, bottlenecks, and roadblocks to progress so they can be addressed across organization boundaries if necessary.



To support each of the three essential functions for UoE, three concepts have been developed. The concepts were instrumental in identifying the needed capabilities, but the identified capabilities may enable more than one concept for each essential function. In the discussion for each essential function, a matrix is provided that shows the cross-walk from concepts to the principal capabilities that support each of them.

A total of 16 capabilities to support civilian-military UoE—three of which support two essential functions each—have been identified and are described briefly in this report. In addition, three of the capabilities (one for each essential function) are described in greater detail. The more detailed discussions present the relationship of the capability to each of the applicable concepts and suggest some potential directions for investing in science and technology initiatives.



3. Identify Resources and Involve Key Participants

Performance of this function entails first understanding the resources and skills needed to conduct critical missions and achieve the common desired outcome, second understanding what potential participants and resources are already present in the operational environment and the nature of their capabilities and on-going activities, then leveraging this Information Preparation of the Environment to build a community of participants with the resources and skills needed to conduct critical missions and achieve the common desired outcome. Three approaches were identified for accomplishing the function according to the willingness of the targeted organizations to be associated with the other participants in the unified action.

In the context of the United Nations, this function is performed by the Inter-Agency Standing Committee (IASC), located in Geneva.

a. Volunteerism and Recruitment

For organizations that will cooperate in the civilian-military unified action, it may be sufficient to advertise the need for particular capabilities and to survey known

participating organizations for referrals to other candidate organizations that could also be recruited into participation.

b. Co-opt or Coerce

Some organizations may have strong motivations to contribute to improving a regional situation although they object to association with other organizations in the civilian-military endeavor. In such cases, negotiation of their participation may be possible in exchange for some consideration controlled by another participant in the unified action. For instance the reluctant organization may require access to facilities or information that can only be provided through partnership with a member of the organizational network of participants. In contested areas, the military may be able to require concessions and cooperation in exchange for access to the region of operations and security. The keys to successful employment of this concept are to identify candidate target organizations that will not step forward and volunteer, to identify their requirements for support, and to negotiate with organizations that can provide the support in exchange for cooperation.

c. Indirect Influence

Some organizations may not be willing to coordinate or cooperate in a civilian-military partnership under any terms; although their independent contributions would still be valued. This concept attempts to create an environment in which the independent organization would elect to contribute in a manner that allows for monitoring of their activities, such that organizations participating in coordinated action can plan around and deconflict with the actions of the independent party.

Map Organizational Networks

- ***Map Organizational Networks*** is the capability to associate attributes to inter-relationships of potential participants:
  - Understand formation of **enclaves of trust** within the network
  - Understand the **flow of information** through the network
  - Understand how network members can **influence others' behaviors**
- Enables "Identifying Resources and Involving Key Participants"
  - Assessing an organization's likely **type of participation** in civilian-military operations
    - Willing participants, reluctant participants, unwilling participants, and non-participants
  - Identifying which participants are **critical "bridges of trust"** between dissimilar and unaffiliated organizations to bring organizations into cooperative and coordinated participation
  - Understanding characteristics of the social environment among organizations that could be used to **influence the decision-making** of organization leadership
- Potentially applicable directions in S&T
  - Social theory and typology for classifying the nature of organizational relationships
  - Metrics for assigning attributes to organizational relationships based on observable characteristics of organizations and communications between them
  - Phenomenology for the decision-making processes of organizational leadership, especially with regard to accepting/rejecting affiliation with government and military

Mapping organizational networks is the capability to identify network members as potential participants and to associate quantitative and qualitative attributes to their inter-relationships for the purpose of understanding how groups or enclaves of trust will form, how information will flow among organizations across the network, and how network members can influence the behaviors and decisions of other members.

The capability supports all three concepts under *identify resources and involve key participants* by indicating how likely any given organization will be to participate willingly in coordination and cooperation activities, thus suggesting appropriate concepts to secure their participation. The capability more specifically supports the *co-opt or coerce* concept by identifying organizations that can act as a "bridge of trust" between dissimilar and unaffiliated organizations or exercise social leverage to bring organizations into cooperative and coordinated participation. The capability also supports the *indirect influence* concept by revealing characteristics of the social environment that could be manipulated to indirectly influence the decisions of organized leadership that will not associate openly with the government or military and shape their choices and actions to be consistent with the objectives of the willing participants in unified action.

The capability to map and understand the relationships among network members is most critical for establishing the means to work with and around reticent or non-cooperative participants in the operation, such as those that are the focus of the *co-opt or coerce* and *indirect influence* concepts for involving participants. Planning to accommodate participants that cannot be included in a multi-party, frank, and open dialog about collaboration and cooperation will rely on a combination of experienced leaders and technological aids.

Science and technology initiatives in applied social theory are needed to develop this capability. Social theory as applied to networks of organizations is not sufficiently mature to be predictive of specific behaviors and reactions. Further research into the basic theory and means of classifying organizations and relationships between organizations is needed. Methods to relate quantifiable attributes of organizations to their behaviors and communications are applicable to populating the organizational network model and are needed. Case studies from this perspective will both contribute to theory development and provide insight and ideas for near-term applications.

Mapping Concepts to Capabilities
Identify Resources and Involve Key Participants

Function concepts are not necessarily mutually exclusive within a single network of participating organizations

Examples of Capabilities Needed	*Concept for Function*: Volunteerism and Recruitment	Co-opt or Coerce	Indirect Influence
Map Organizational Networks (A.1)	✓	✓	✓
Advertise and Recruit (A.2)	✓		
Survey and Poll Participants (A.3)	✓	✓	
Negotiate Collaboration (A.4)	✓	✓	
Monitor Open Source Information (A.5)		✓	✓
Track Individuals and Groups (A.6)			✓

Checks indicate higher-priority capabilities for success of each concept

The cross-walk matrix above indicates the capabilities for *identify resources and involve key participants* that are most critical for enabling each of the concepts for performing the function. In addition to mapping organizational networks, the other capabilities supporting this function are described below.

Advertise and recruit is the capability to make known what resources, skills, and facilities are needed for a successful outcome to those organizations that are likely to become willing participants in a civilian-military endeavor and to approach potential participants with a compelling case for their involvement.

Survey and poll participants is the capability to query organizations that are willing to participate in order to identify the resources, skills, and facilities that they provide to support the endeavor and promote UoE. Surveying and polling can also be used to identify additional candidate organizations to target for recruiting.

Negotiate collaboration is the capability to discover inducements and incentives for organizations to coordinate and cooperate with other participants of the network on terms that are mutually agreeable with the other participants and to build a consensus among participants with respect to the objectives and principles of the unified action.

Monitor open source information is the capability to find organizations that are planning or executing independent operations within the region of interest through reporting about their activities or monitoring their financial transactions.

The capability to *track individuals and groups* supports *identify resources and involve key participants* by enabling monitoring of the movement of people representing independent organizations into and about the region of interest. This monitoring permits assessment of the organization's intentions, the scale of its effort, the focus and type of activities planned, and any third party organizations with which it may be involved.

Provide Means and Processes for Coordination

- Objective is to provide ways for participating organizations to achieve the highest levels of cooperation and coordination practical through mechanisms and agreements for sharing information and allocating tasks
- Concepts:
  - Open Access to Data
    - Members of each organization (all members or selected ones) are allowed to directly access relevant data stored in information systems of other organizations
  - Common Data Repository
    - Relevant data are published in a commonly accessible repository—which all member organizations can access—rather than allowing direct access into the information systems of each organization
    - Each organization selectively determines what information it will share, although all shared information is freely available to other member organizations
    - Data pooled in a common repository may be more structured and have more value than the same data distributed across multiple organizations' information systems
  - Open Channels of Communication
    - Reliable and secure means are established for members of one organization to rapidly contact the right members within another organization to provide them with relevant data or request needed data from them
    - Ad hoc flow of information among organizations is enabled, but controls on what information is shared or withheld are decided on a case-by-case basis

4. Provide Means and Processes for Coordination

Performance of this function provides organizations with the technical means to share information, cooperatively plan and allocate tasks, and shape the organizational network to minimize cultural obstructions to information sharing and coordination. We identified three approaches for accomplishing the function according to an organization's need to maintain control over the data it provides to the civilian-military partners.

a. Open Access to Data

Under this approach access is provided into an organization's information systems either through accounts created for members of other organizations or through portals between the information systems of different organizations. The key issue is to provide access to all relevant data in real time while preventing access to inappropriate information.

b. Common Data Repository

When direct access to information systems is not an option for information sharing, an alternative concept is to establish a common area for all participating

organizations to publish information that is appropriate to share. Key issues are making information available in the common repository in a timely manner, establishing a common organization and formats for information, and providing search and browsing capabilities for the content of the data repository. The concept is illustrated by the ReliefWeb, an electronic clearinghouse managed by the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) for information to help the humanitarian community.

c. Open Channels of Communication

This approach may be adopted when neither of the other approaches are acceptable to members of the organizational network or may be employed in parallel with the others as an adjunct construct for sharing information. Rather than making data directly available for searching and browsing, this concept makes the personnel within each organization available to individuals from other organizations. The *open channels* concept creates an environment in which individuals can rapidly identify whether any organization in the network has information, experience, or capabilities they need to access; identify the specific points of contact within the organization to relay the request for support; and provide contact information that is useful in reaching the points of contact with the request. An example of this concept under development by UN OCHA is the Directory of Contact Points for Disaster Response, which will provide contact information for emergency response services of national and international organizations.

Automate Information Controls

- ***Automate Information Controls*** is the capability to respond in real time to a request for information or data:
  - **Find and extract** relevant information from private data sources
  - Segregate information into **release and withhold categories** based upon:
    - Requestor, nature of request, information content, and policies of data "owner"
  - Provide the releasable information in **readable format**
- Enables "Providing Means and Processes for Coordination"
  - Providing controlled access (without intervention by human monitors) in order to **open private data sources** to other participating organizations
  - Automating generation of **multiple distribution versions** of a document or data set
    - For release with different distribution controls or classification levels
  - Automating and **accelerating periodic updates** of controlled information for routine publishing to common data repositories
- Potentially applicable directions in S&T
  - Metadata standards and intelligent-agent software to apply heuristic guides to the releasability of private information to "trusted" agents of another organization
  - Standard and scalable database technology to maintain registry of "trusted" agents and applicable distribution controls for different classes of private information
  - Tools for automated redaction of portion-marked classified information
  - "Tear line"-equivalent documents for classified electronic media

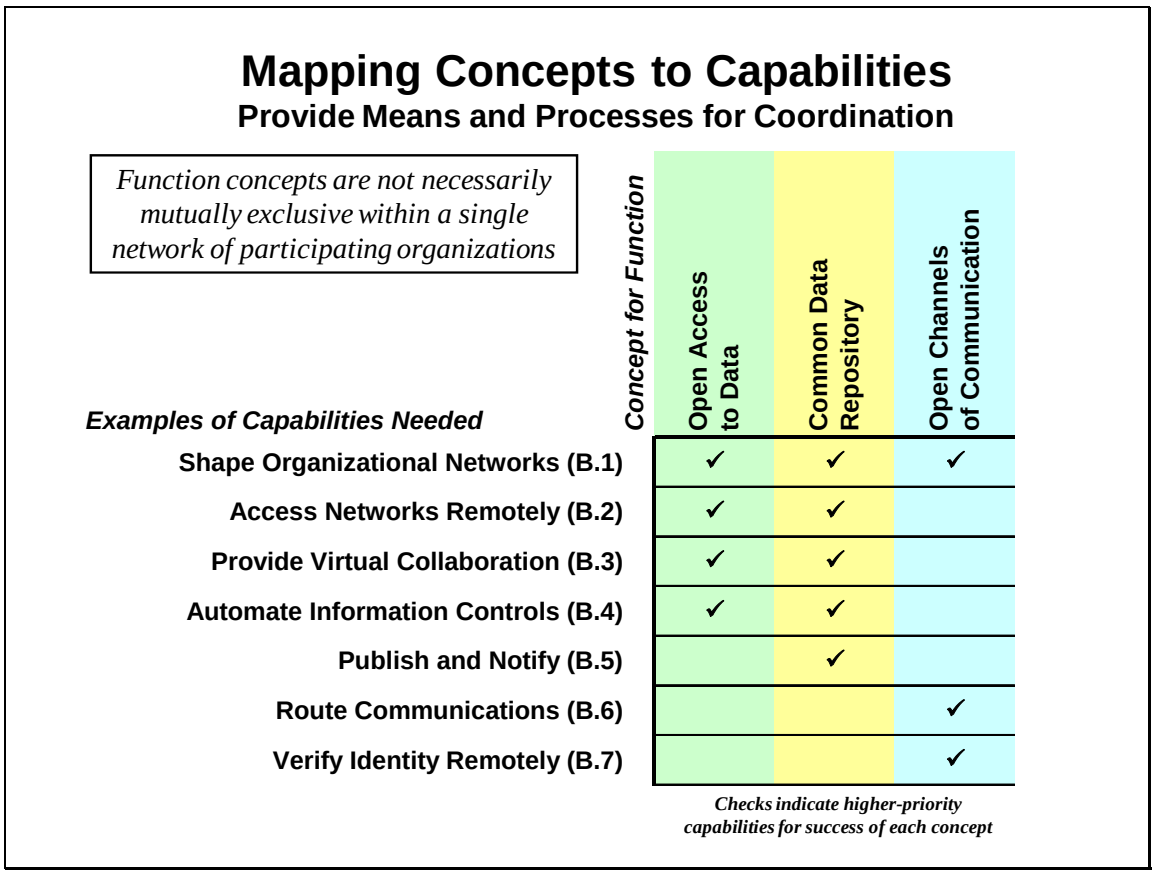
Automate information controls is the capability to provide information in real time in response to a legitimate request from a trusted agent within a partner organization. The capability includes finding and extracting relevant information, segregating the information into release-and-withhold categories with confidence appropriate to the sensitivity of the information, and providing the information in a readable format to the requestor. Human intervention and exercise of judgment in response to every information request will result in a tremendous human workload when close coordination and frequent exchanges of data are needed. Repeated and frequent human intervention will also result in slower processes and less consistent results.

The capability supports the concept of *open access to data* by providing a means to allow access to appropriate information across network boundaries without the need for human monitors to check the content for information that should be withheld. The capability supports the concept of a *common data repository* by allowing automatic retrieval of controlled shareable information to a common repository and more rapid and efficient creation of a document in multiple versions to accommodate different distribution limitations or classification levels. In printed material, different distribution

limitations can be accommodated with "tear-line" documents, in which different versions of a document are concatenated. When the document is requested, the appropriate version is found, torn from the bulk, and passed to the partner organization. *Automate information controls* would make similar requests possible for information stored in information systems and on electronic media.

Implementing the capability requires cataloging the sensitive information from descriptors of the content or scanning the content in context; verifying the credentials of the information requestor; and adjudicating which content can be released based on the identity of the requestor and the information policies of the owner. Investment in science and technology is needed to develop these abilities. Specifically, development of metadata standards and intelligent-agent methods for heuristic guides to releasability of information would be applicable to the problem of recognizing and cataloging sensitive information content. Adjudicating release of information would be aided by further development of standard and scalable database technology for maintaining registries of "trusted" agents and categories of controlled information that can be shared with them. Finally, research into automated redaction of classified information and an equivalent to tear-line documents for electronic media would support this capability.

Government research in this area is active, particularly for information sharing within military coalitions. The Net-Centric Enterprise Services (NCES) program was chartered to develop capabilities for collaboration and information-sharing in a coalition and multi-level security environment. The program was separated into two phases with security and information controls pushed into the second capability increment; now the future of NCES increment two is in doubt. A second program that is contributing in this area is the Multi-National Information Sharing (MNIS) program. MNIS is working toward consolidating some of the CENTRIX networks that are maintained, each to aid information-sharing within a single coalition. By consolidating networks, DoD hopes to reduce infrastructure hardware needed and operating and support costs incurred. However, not all information can be shared with all members across a multi-coalition and multi-theater shared network, and MNIS will have to address automated controls for which partners are allowed access to what information on the new information-sharing network. The security and information control problem that MNIS is addressing is equivalent to the problem faced for automating information controls for civilian-military organizational networks.



The cross-walk matrix above indicates the capabilities for *provide means and processes for coordination* that are most critical for enabling each of the concepts for performing the function. In addition to *automate information controls*, the other capabilities supporting this function are described below.

Shape organizational networks is a capability that extends the capability to *map organizational networks* to include manipulating the relationships among organizations to improve UoE and applying leverage through the network to change the ways that organizations will interact. Some organizations will work more effectively together than alone; some organizations should be isolated and shielded from one another to work effectively. *Shape organizational networks* creates those conditions.

Access networks remotely is the capability to access appropriate information on private networks from outside those networks once identification and authorization have been verified through an access portal or other network interface. The capability should provide access from mobile devices and allow rapid addition and removal of credentials from access lists.

Provide virtual collaboration is the capability of participating organizations to hold meetings, negotiate, contribute to shared discussion forums and collaborate in preparing documents and related activities from distributed geographic locations. Already numerous products are commercially available to enable this form of collaboration within organizations, indicating emerging commercial capability across organizational boundaries.[4] Primarily, standards of interoperability are needed so individual organizations can choose a software vendor and solution that is right for them and interoperable with the software of their mission partners.

Publish and notify is the capability to post documents or information in a location accessible to trusted members of other organizations and inform interested parties that the information is available. The challenge is notifying the proper individuals (those that have an interest and will use the posted information in a timely manner) without creating an overload of notices for anyone.

Route communications is the capability to identify the proper recipient of a message across organizational boundaries and to establish a communication link supporting needed timeliness, speed, and data formats. The capability provides a service similar to a switchboard operator across multiple organizations, although a key feature is identifying appropriate offices or individuals based on the context of the message to be relayed.

Verify identity remotely is the capability to confirm credentials presented from a remote location over diverse communication channels. This capability supports others under *provide means and processes for coordination* by assuring that an individual accessing an information system or receiving information is trusted.

[4] Defense Venture Catalyst Initiative (DeVenCI) Information Sharing and Collaboration Workshop, Arlington, VA, September 10, 2008.

Monitor, Assess, and Aid in Cooperation

- Objective is to assure that the complex of participating organizations is performing effectively by leveraging capabilities of cooperation and coordination to provide support and assistance to individual organizations as needed
- Concepts:
  - Automated Activity Tracking
    - Operating procedures are fostered and use of embedded sensors is encouraged to permit automated collection and evaluation of information on the activities and status of participating organizations to facilitate coordinating assistance and rescue
    - Tracking information can be collected and monitored within each participating organization, in a common shared facility, or by a single agency as service to all
  - Voluntary Self-Reporting
    - Each participating organization "publishes" data about its activities, status, and needs for the purpose of advertising a surplus of capability, availability to take over new responsibilities, or to request assistance, relief, or rescue
  - Independent Checks
    - Applicable when an independently acting organization does not consent to monitoring, but its areas of operation and general functions performed are known and other coordinated organizations derive value from checking its activities
    - Another organization (or many in a distributed fashion) monitor the activity and progress of the independent actor for the purposes of deconflicting and avoiding redundancy with the independent actor's efforts

5. Monitor, Assess, and Aid in Cooperation

Performance of this function leverages capabilities of coordination to provide support and assistance to individual organizations or teams as needed to improve achievement of common objectives. Three approaches were identified for accomplishing the function according to the willingness of participating organizations to provide information about their whereabouts, status, and activities to other organizations. All of the approaches describe ways of developing a common operational picture of the civilian-military environment, consistent with information that can be shared across organizations.

a. Automated Activity Tracking

The most efficient means of collecting data is to embed sensors and communications that routinely report information useful for building the civilian-military common operational picture to an organization or facility that can monitor and act on the information. Without embedded sensors, adopting operating procedures to record and report relevant events can make much of the needed data available. Data of interest

would be locations of vehicles and individuals, levels of critical supplies or equipment, and team status (as normal operations, reduced capability, or needing relief or rescue).

b. Voluntary Self-Reporting

For organizations that object to automated tracking as too intrusive, an alternative is to report information of value for improving cooperation as the need is perceived. Such voluntary reporting can consist of statements of intent regarding near-term activities, periodic status and progress reports, or urgent requests for support, resupply, or rescue. Voluntary self-reporting can also originate at any level within an organization, may address any timescale relevant for the civilian-military endeavor, and may contain information with value that is perishable, persistent, or both.

c. Independent Checks

The organizational network model accommodates organizations that contribute to the common goals of the participants without coordinating or cooperating with any other organization. For such organizations, the previous two concepts are not relevant and monitoring their activities for deconfliction or providing indirect assistance will require independently collecting the needed information.

Track Individuals and Groups

- ***Track Individuals and Groups*** is the capability to monitor movement of people, vehicles, and critical equipment or supplies:
  - Provide **awareness of their location** for purposes of safety and security
    - Either individually or collectively depending on the concept supported
  - Develop a history of activities to **identify current regional expertise**
  - Understand activities and intent to **deconflict with non-coordinating organizations**
- Enables "Monitoring, Assessing, and Aiding in Cooperation"
  - Providing the location of teams if **rescue or emergency aid** is needed
  - Monitoring **critical equipment or supplies** available to an organization, e.g., with respect to **urgent resupply**
  - **Measuring progress** of organizations with respect to schedules of movement
- Potentially applicable directions in S&T
  - Cooperative vehicle location reporting system, i.e., like Blue Force Tracker
  - RFID-like tags for distributed sensor networks or remote sensing technologies to provide a non-obtrusive tag, track, and locate (TTL) capability
  - Tap infrastructure networks for geo-referenced communications, "tagged communications"

Track individuals and groups is the capability to monitor geographic movement of people, vehicles, and critical equipment or supplies (cooperatively or not and individually or collectively depending on the concept supported) for the location awareness component of the civilian-military common operational picture. The location information derived from tracking can be used for safety and security, for deconfliction purposes, to identify potential witnesses to significant events, and to identify organizations or individuals with a history in a region and relevant expertise.

If collected, used, and controlled by the military, data for tracking locations of participants to a unified action could become a divisive issue and counter-productive to UoE; particularly if the military is not sharing data on the locations of their forces and personnel. Although collecting and analyzing tracking data may be done most efficiently and effectively by a military organization, the greater need for mutual trust and voluntary cooperation among organizations may dictate that the responsibility is better placed with a civilian organization. Especially for cooperative tracking systems, an alternative is for the tracked locations of individuals and groups to be collected and maintained by their parent organizations, which could then choose (or not) to release the location information to other participating organizations based on the details of the situation.

The capability supports all three concepts under *monitor, assess, and aid in cooperatio*n by providing location awareness. Beyond location awareness, the capability supports *automated activity tracking* by providing a measure of progress with respect to a mobile team's schedule of movement. The capability also supports the *independent checks* concept by tipping monitors to areas in which the independent agent has been operating for follow-up collection on their activities.

Tracking (non-cooperative and cooperative) has been of interest for military applications for a long time. The *track individuals and groups* capability calls for developing tracking systems and methods that can be shared with non-military partners. Potential directions for investment in science and technology would build on military advances in this area and help create analogous capabilities for civilian-military partnerships. A system such as Blue Force Tracker that provides cooperative vehicle location reporting is needed. A non-obtrusive tag, track, and locate capability for marking critical vehicles, people, equipment, and supplies is needed—such a capability may be provided by radio frequency identification (RFID) tags that can be detected and queried by distributed sensors or remote sensing technologies. The ability to associate a geographic location with a mobile communications link on a network infrastructure may provide useful "tagged communications" systems—many cellular devices like phones include GPS capabilities already.

Mapping Concepts to Capabilities
Monitor, Assess, and Aid in Cooperation

Function concepts are not necessarily mutually exclusive within a single network of participating organizations

Examples of Capabilities Needed	*Concept for Function*: Automated Activity Tracking	Voluntary Self-Reporting	Independent Checks
Organizational Network Modeling (C.1)	✓	✓	✓
Measure Success of Collaboration (C.2)	✓	✓	✓
Compatible Messages to Population (C.3)	✓	✓	✓
Verify Identity Remotely (C.4)	✓	✓	
Survey and Poll Participants (C.5)		✓	✓
Track Individuals and Groups (C.6)	✓		✓

Checks indicate higher-priority capabilities for success of each concept

The cross-walk matrix above indicates the capabilities for *monitor, assess, and aid in cooperation* that are most critical for enabling each of the concepts for performing the function. In addition to *track individuals and groups*, the other capabilities supporting this function are described below.

Organizational network modeling is the capability to formalize the implicit models of the organizational network underlying *map organizational networks* and *shape organizational networks* to provide quantitative predictions regarding information-sharing between organizations and organizations' decisions concerning affiliation and association.

Measure success of collaboration is the capability to identify context-specific metrics for effectiveness of coordination and cooperation, to collect data to support evaluation of the metrics, and to interpret results to identify problems where coordination and cooperation are not working and to recommend solutions to improve civilian-military UoE.

Compatible messages to population is the capability to assess whether the messages conveyed to the population by each of the participating organizations are

consistent with the overall goals of the civilian-military unified action, generally supportive of one another, and mutually reinforcing.

Verify identity remotely is the capability to confirm credentials presented from a remote location over diverse communication channels. This capability supports others under *monitor, assess, and aid in cooperation* by assuring that a source of information about activities is trusted. The capability is essentially the same as for the function *provide means and processes for coordination*, although with more emphasis on verifying sources.

Survey and poll participants is the capability to query organizations willing to participate in information collection on the activity and status of their teams, their plans and intentions, their available resources, and information they may possess concerning the activities of independent actors in the civilian-military environment. The capability is essentially the same as for the function *identify resources and involve key participants*, although with different information targeted by the survey and poll.

Observations on Functions and Concepts

- No single concept (for each essential function) will be appropriate for all participants
  - A different functional concept may best apply for each individual organization
  - A mixture of all the concepts identified may be required
    - The concepts are not mutually exclusive within a single context
- A coordination infrastructure is implicitly assumed by most of the concepts
  - Three generic classes of coordination infrastructure are
    - Single-agency lead
    - Common coordinating facility
    - Distributed coordination
  - Appropriate roles of military and government organizations depend on
    - Details of the operational environment
    - Nature of the civilian-military endeavor

C. DISCUSSION

1. Implications of the Heterogeneous Nature of the Network

The essential functions for UoE identified in this discussion will be implemented differently depending on the levels of coordination and trust between pairs of organizations in the network of participants. Because coordination and cooperation across a large network of diverse organizations will not be uniform, different concepts will likely have to be employed for different parts of the network. In each of the three essential functions, all three of the supporting concepts may be required to succeed with all participants. In light of this fact, the concepts should not be viewed as mutually exclusive and should be used together as needed and dictated by circumstances. Development of capabilities should not focus on enabling one concept for performing an essential function to the exclusion of others.

Although a mixture of all concepts may be needed to perform an essential function for a very large and diverse network of participating organizations, the net benefit to UoE from employing each concept will not necessarily be the same. Priorities

for developing capabilities should reflect the diversity of the concepts they enable and the benefits derived from each of those concepts. Generally one would expect to get more UoE benefits from coordination and cooperation between organizations that share mutual trust than from organizations that are distrustful of one another and only share the minimum required information. If this expectation holds true, there would be more benefit to the essential function of *identify resources and involve key participants* from developing capabilities under the *volunteerism and recruitment* concept than the *indirect influence* concept. In this sense, some capabilities deserve earlier attention and higher priority for development than others.

2. Leadership Roles in Unity of Effort

Two forms of leadership are required to actively improve UoE: leadership in developing and providing the means for coordination and collaboration (taking responsibility to provide infrastructure and facilities needed) and leadership in organizing cooperation and mutual aid (taking responsibility for deconflicting plans and allocating responsibilities as accepted by participants). In either case, the leadership role can be vacant (unfortunate as this would be), be taken by a single organization, or be distributed across many organizations acting together. One can also conceive of situations where sub-groups within a complex organizational network are each led by a distinct leadership element, resulting in a fractured leadership for the organizational network as a whole.

The role of the military in relation to leadership in civilian-military unified action should depend on the operational environment and the specific nature of the action undertaken. In actions that are primarily military in nature with a civil adjunct mission or civilian-military action close to heavy fighting, it is most appropriate for the military to take a prominent leadership role. As stressed early in the chapter, leadership in civilian-military endeavors should not be confused with command authority.

3. Architectures for Coordination

Closely coupled to the issue of leadership in providing means and infrastructure for coordination is the type of coordination architecture that is adopted for a specific endeavor and set of participating organizations. Many capabilities discussed implicitly assume some coordination architecture to provide infrastructure, facilities, and information exchange. A particular complex organizational network may require a coordination architecture of mixed type to accommodate all participating organizations.

Three generic classes of coordination architecture are mentioned here:

- *Single agency lead*—A lead agency provides the coordination mechanisms and facilities as a service to other participants; this does not imply authority to direct activities of any participating organization.
- *Common coordination facility*—Participating organizations pool resources through contributions of equipment, facilities, and support to establish a jointly run information clearinghouse and center for collaboration and cooperation.
- *Distributed coordination*—Each participating organization handles its own coordination with each of its "neighbors" in the organizational network and publishes information to be shared with them; flow of information is directed only locally.

Desired Attributes of Technologies

- The majority of concepts entail empowering participants to collaborate and share information by providing them with appropriate technological solutions
  - At a minimum, technologies should be safely transferable to all types of participating organizations broadly across the JIMM spectrum
    - In a distributed cooperation and coordination model, each organization "owns," controls, and publishes data about its own activities using systems under its own control
  - Ideally, technologies should be commercially available so that individual organizations can equip themselves to operate cooperatively and in coordination with others
    - So as not to burden DoD or another lead agency with providing the hardware
    - Allows organizations to use the systems electively for internal self-coordination to develop and maintain proficiency with the technology
- A critical attribute of systems for cooperation and collaboration is interoperability across distinct commercial "brands" acquired by different organizations
  - Commercial implementations should be based on non-proprietary standards for communications channels, network interfaces, and data formats
  - Technology initiatives should foster development of universal standards for application of the technology in commercial products

4. Desired Attributes of Technology

Because participating organizations will have much of the capability for coordination and cooperation, it is essential that technology be safely transferable to all types of military, governmental, and private organizations across the JIMM spectrum. Furthermore, the technology should be commercially available so organizations can equip themselves and use the technology for internal self-coordination as well. Coordination goals will be obstructed if materiel solutions acquired from one commercial source are not interoperable with those of another source or "brand." For instance, during relief efforts following the 2004 Indian Ocean tsunami, the United Nations could not use U.S.-provided airlift from Thailand to forward sites because of incompatibility with the U.S. tracking system; DoD cargo tracking systems are not compatible with the international standard system used by the humanitarian community.

To achieve interoperability of coordination means commercial systems should be based on non-proprietary standards for communication channels, network interfaces, and data formats. A central aim of technology initiatives to improve UoE should be the establishment of universal interoperability standards associated with the use of the technology in commercial products.

ADDITIONAL IDA RESOURCE DOCUMENTS

Over the past years, Mr. Martin Lidy of the Operational Evaluation Division at IDA has directed a number of efforts focused on civilian-military issues. References to this work are listed here. For additional information on any of these documents, please contact Martin Lidy at mlidy@ida.org.

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IV. COUNTERING CORRUPTION IN HOST NATION POLICE FORCES

Summary

Countering corruption in host nation (HN) police forces is a critical dimension of irregular warfare and is essential to establishing security and the rule of law fundamental to a stable society. However, a necessary condition that must exist to counter corruption in HN police forces is a legitimate HNG that is not corrupt and seeks to uphold laws. The type of corruption that is the focus of this work is dysfunctional police corruption in which the police undermine the rule of law and fail to provide security to the people. Elements of dysfunctional police corruption include social corruption (favoritism), police crime, and strategic partnering with organized crime.

We identified capabilities for countering corruption in HN police forces and identified directions for S&T initiatives that could help enable these capabilities. The approach taken for this work involved reviewing literature on police corruption as well as engaging with subject matter experts regarding current experiences in Iraq and Afghanistan. From this background, causes of and counters to police corruption were identified. The counters include approaches related to the individual officer, job-related improvements, changes in organizational structure, changes in oversight, and community involvement.

Capabilities for countering police corruption include vetting new recruits; training recruits to professional standards and values; offering professional development; increased pay; partner rotation; monitoring, investigation, and disciplinary actions; creating "tip lines" regarding police abuses; and forming neighborhood organizations analogous to "neighborhood watch" groups to work with the police.

The next step was to identify directions for S&T initiatives that would help enable these capabilities. The directions for S&T initiatives fell into one of three broad categories: social/psychological, organizational, and "hard" technologies. The S&T directions that relate to social/psychological initiatives include giving objective metrics for selection of the police corps, providing aid in understanding social relationships of a culture, and improving the means for communication with the HN. The S&T initiatives that fall into the organizational category include initiatives aimed at improving leadership and reporting structure,

providing the means for monitoring police activities, and identifying new challenges. The hard-technology initiatives include improving communications and decision making and providing a framework of documented accountability to help minimize corruption.

Countering Corruption in Host Nation Police Forces: Overview

Objectives: Identify capabilities for countering corruption in host nation (HN) police forces and identify directions for science and technology initiatives that could help enable the capabilities

Approach:

- Review literature on police corruption, its causes, and counters
- Review current experiences in Iraq and Afghanistan
- Identify range of capabilities for countering corruption
- Identify S&T initiatives that could enable the capabilities
- Host two workshops for subject matter experts to address these issues
- Summarize and prioritize the results

Outline of Brief:

- Motivation
- Background on Corruption
- Police Corruption
- Capabilities
- Directions for Technology Initiatives
- Workshop Results
- Summary

A. OBJECTIVE

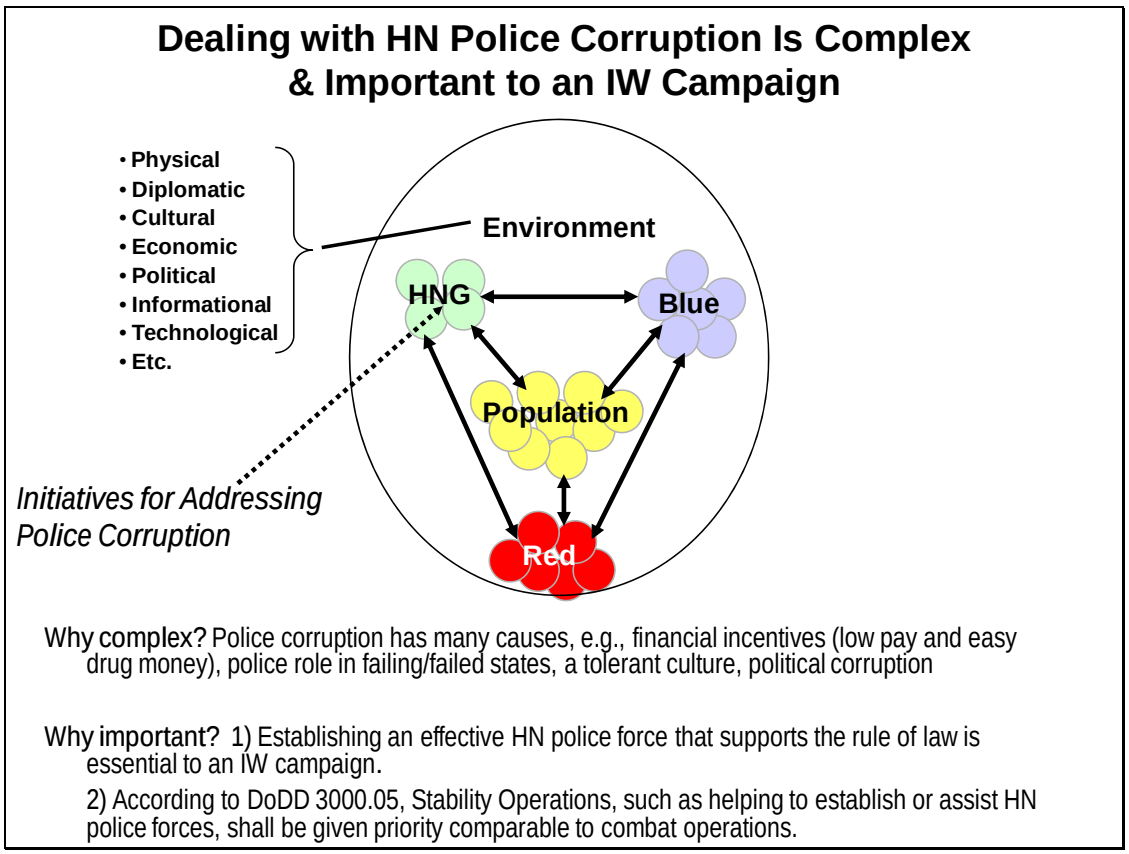
The objective of this chapter is to identify capabilities for countering corruption in HN police forces and to identify directions for technology initiatives that could help enable the capabilities.

The approach began with reviewing literature on police corruption, its causes, and countermeasures, and reviewing current experiences in Iraq and Afghanistan. With this background, a range of capabilities for countering police corruption were identified. From the capabilities, we identified S&T initiatives that could enable the capabilities. In addition to this approach, the study team collaborated with Innovation Business Partners, Inc. (IBP) and the Kiernan Group in an effort to identify technologies for countering corruption in police forces in Afghanistan. Toward this goal, we hosted two workshops for subject matter experts to address the issue of police corruption. Finally, the results from our approach and the collaboration are summarized and prioritized.

The chapter is organized by the following sections. First, motivation for countering corruption in HN police forces will be provided. This section will be

followed by a general discussion on corruption, which will lead into a discussion on police corruption, including aspects of policing that influence corruption and countermeasures to police corruption. Capabilities that are needed for these countermeasures will then be determined, and directions for technology initiatives that could enable the capabilities will be identified. Finally, we will briefly describe some of the results of the two workshops that were held and summarize the overall findings of this report.[1]

[1] For a complete description of these workshops and the results, see Innovation Business Partners, Inc., *Countering Corruption in Host Nation Police Forces*, Final Report, October 2008 (contact Info@InnovationBP.com or (914) 474-9499).



B. MOTIVATION

Police corruption is endemic in Iraq, Afghanistan, and other failing/failed states. For example, according to Ambassador Richard Holbrooke, in current-day Afghanistan:

> The police are the front edge of Afghanistan's biggest problem….The massive, officially sanctioned corruption and the drug trade are the most serious problems the country faces, and they offer the Taliban its only exploitable opportunity to gain support. [1]

Police corruption in an HNG is complex because it has many enablers such as financial incentives (low living wage and easy drug money), the role of police in failing/failed states, a corruption-tolerant culture, and political corruption. However, countering corruption in HN police forces is essential to an IW campaign. It is critical for establishing security and the rule of law, which are fundamental to establishing a stable society. Police officers are the faces of the government that are seen by virtually all of the population. They deliver an essential service that everyone sees. Hence, their ability to perform to non-corrupt standards can markedly influence the local population's willingness to support the government.

The police perform important functions regarding the stability of a political system. First, they provide “crime management” through the prevention, detection, and resolution of all types of crimes from petty theft to murder. The more effective they are in performing this function, the more likely the local populace will support their efforts. Second, they provide “order management” by resolving large and small conflicts in the community. The ability to legitimately resolve domestic disputes, control traffic, and prevent petty crime is probably as important as settling other disputes because these are the actions seen every day by the citizens. Because of these important functions, local police should be one of the first components of civil government to be supported and strengthened. Their ability to establish and maintain formal and informal control is paramount to any successful IW strategy. Thus, countering corruption in HN police forces is of great significance to U.S. national interest.

Military Roles in Stability Operations

DoD Directive (DoDD) 3000.05 provides guidance on stability operations that will evolve over time as joint operating concepts, mission sets, and lessons learned develop.

According to the Directive:

4.1 Stability operations are a core U.S. military mission that the Department of Defense shall be prepared to conduct and support. They shall be given priority comparable to combat operations and be explicitly addressed and integrated across all DoD activities including doctrine, organizations, training, education, exercises, materiel, leadership, personnel, facilities, and planning.

4.2 Stability operations are conducted to help establish order that advances U.S. interests and values. The immediate goal often is to provide the local populace with security, restore essential services, and meet humanitarian needs. The long-term goal is to help develop indigenous capacity for securing essential services, a viable market economy, rule of law, democratic institutions, and a robust civil society.

4.3 U.S. military forces shall be prepared to perform all tasks necessary to establish or maintain order when civilians cannot do so. Successfully performing such tasks can help secure a lasting peace and facilitate the timely withdrawal of U.S. and foreign forces. Stability operations tasks include helping:

4.3.1 Rebuild indigenous institutions including various types of security forces, correctional facilities, and judicial systems necessary to secure and stabilize the environment.

DoD Directive (DoDD) 3000.05 (Military Support for Stability, Security, Transition, and Reconstruction Operations) provides guidance to the U.S. military for its role in stability operations. The Directive emphasizes in section 4.1 that stability operations should be given the same priority as combat operations. Section 4.2 mentions that the U.S. military will provide security to the local population until the HNG can effectively provide it. In section 4.3, it is stated that the U.S. military should be prepared to perform all tasks necessary for stability operations, with rebuilding of security forces explicitly mentioned in section 4.3.1.

Corruption Worldwide

- The most commonly used definition for **corruption** is ***the abuse of public power for private gain.***[a]

- Corruption is a problem that affects every country and is present in many sectors of society—politics, finance, education, healthcare, military, public office.

- The degree and type of corruption varies from country to country.

Corruption by Country
According to Transparency International Corruption Perceptions Index 2007

Least Corrupt

Country Rank		Score out of 10
1	Denmark	9.4
	Finland	9.4
	New Zealand	9.4
4	Singapore	9.3
	Sweden	9.3
6	Iceland	9.2

Most Corrupt

Country Rank		Score out of 10
179	Somalia	1.4
	Myanmar	1.4
178	Iraq	1.5
177	Haiti	1.6
175	Tonga	1.7
	Uzbekistan	1.7
172	Afghanistan	1.8

Selected Countries

Country Rank		Score out of 10
9	Canada	8.7
	Norway	8.7
12	Luxembourg	8.4
	Britain	8.4
16	Germany	7.8
19	France	7.3
20	USA	7.2
30	Israel	6.1
43	South Korea	5.1
	South Africa	5.1
61	Cuba	4.2
72	China	3.5
79	Saudi Arabia	3.4
105	Egypt	2.9
131	Iran	2.5
138	Pakistan	2.4
143	Russia	2.3

Full list available on www.transparency.org

[a]As used by World Bank, International Monetary Fund, United Nations, Transparency International, research literature

C. BACKGROUND ON CORRUPTION

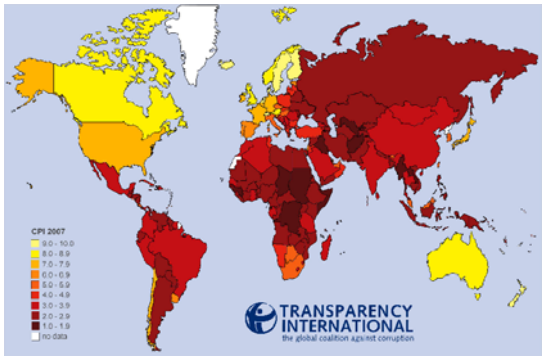
Corruption is a broad term, but the most commonly used definition for corruption is the abuse of public power for private gain (as used by the World Bank, International Monetary Fund, United Nations, Transparency International, etc.). Typical examples of corruption include bribery, fraud, extortion, and embezzlement. The gain may not always be personal but can benefit one's family, tribe, friends, class, party, etc. This social corruption takes such forms as nepotism, cronyism, clientelism, and favoritism (ethnic, religious, political, etc.).

Corruption is a problem that affects every country and is present in many sectors of society including public office, politics, finance, education, healthcare, and military. However, the degree and type of corruption varies from country to country. Transparency International, a global anti-corruption organization, publishes a yearly Corruption Perception Index (CPI) that ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians [2]. It is a composite index, a poll of polls, drawing on corruption-related data from expert and

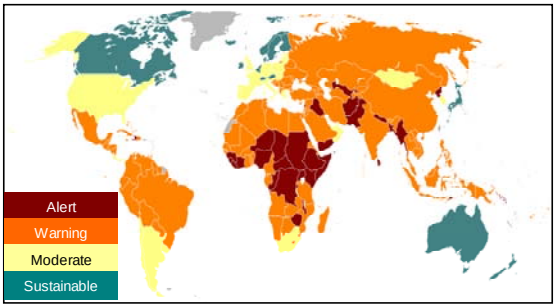
business surveys carried out by a variety of independent and reputable institutions. The index ranks countries on a scale from 10 to 0, according to their perceived level of corruption. A score of 10 represents a country that is perceived to have no corruption, while a score of 0 indicates a country that is totally corrupt. According to the 2007 CPI, which ranks 180 countries, the least corrupt countries are Denmark, Finland, New Zealand, Singapore, Sweden, and Iceland. The most corrupt countries are Somalia, Myanmar, Iraq, Haiti, Uzbekistan, Tonga, and Afghanistan.

Corruption Worldwide vs. Failed States

2007 Corruption Perception Index
Transparency International

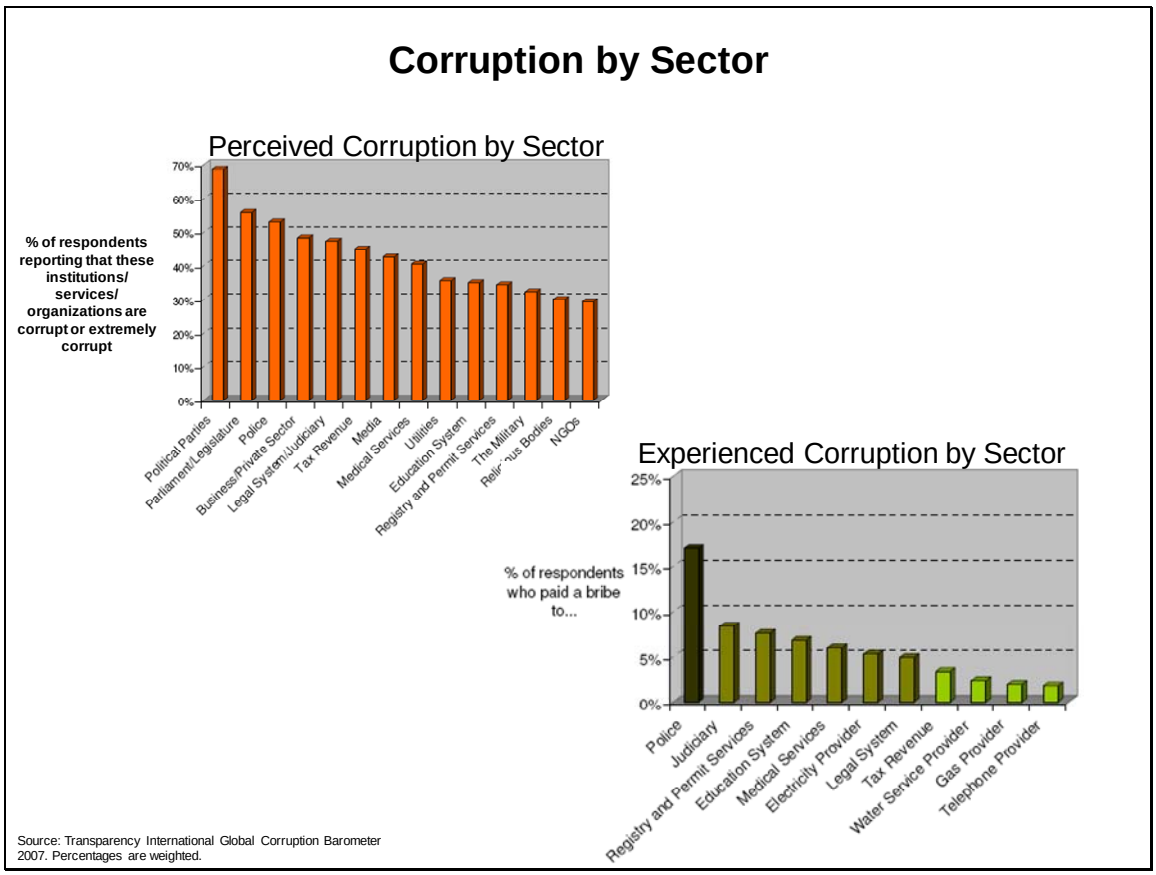


2007 Failed States Index
Fund for Peace



Since it is likely that most efforts to counter corruption in HN police forces will occur in failed or failing states, it is interesting to compare the 2007 CPI with the 2007 Failed States Index (FSI) [3]. The FSI is produced by the Fund for Peace, a research and educational organization that works to prevent war and alleviate the conditions that cause war. The index ranks countries vulnerable to state failure by assessing 12 social, economic, political, and military indicators as well as the core state institutions needed to cope with the pressures on a state. In the FSI above, countries that are very stable are colored green. Countries that are moderately stable are colored yellow. States that are borderline or in danger of failing are colored orange, and countries that are failing are highlighted red.

By comparing the CPI to the FSI, as illustrated by the mapping of the two indexes above, it is obvious that there is a strong correlation between the perceived level of corruption in a country and state failure. For example, the most corrupt countries of Somalia, Iraq, and Afghanistan are also the most unstable states. Likewise, the least corrupt countries of Denmark, Finland, and New Zealand are the most stable.



To gain insight into the perceptions and experiences of corruption in various public sectors reported by the general public, Transparency International also produces an annual Global Corruption Barometer (GCB) [4]. The GCB examines the effect of corruption on the daily lives of ordinary citizens by assessing how and where they encounter corruption. For the 2007 GCB, Transparency International interviewed 63,199 people in 60 countries throughout the world. The 2007 GCB reports that, although political parties and the legislative branch are perceived by the public to be the institutions most tainted by corruption, the police were perceived to be significantly more corrupt than the remaining institutions and service sectors.

In addition to giving an account of perceived corruption in various sectors, the GCB also reports on the general public's actual experience with corruption as evidenced by paying bribes when they come into contact with public service sectors. The 2007 GCB finds that out of the 11 service sectors considered, the police are the institution most affected by bribery. The number of respondents who reported paying a bribe to the police was more than double the number of respondents who reported paying a bribe to any other sector. According to the GCB, one in every four citizens around the world who

had contact with the police was asked to pay a bribe, and one out of every six citizens reported that they paid the bribe. The police, then, are not only viewed as being one of the most corrupt public sectors, but they are also reported to be the sector demanding the most bribes. Thus, strong alignment exists between the public's perception of police corruption and their experience with it.

Types of Police Corruption

1. **Misconduct**—Breaks departmental rules and regulations (e.g., sleeping on the job, absenteeism, receiving free "perks")
2. **"Conventional" Corruption**—Something is done or not done for some reward (bribery, kickbacks, shakedowns, internal payoffs)
3. **Strategic Corruption**—Police and organized crime enter into agreement so that illegal activities (prostitution, gambling, pornography) can continue operating
4. **Predatory Corruption**—Police actively involved in corruption (i.e., extort money and organize the graft)
5. **Noble Cause Corruption**—Using illicit means to secure convictions (falsifying testimony, intimidating witnesses, planting evidence, etc)
6. **Police Crime**—Police-initiated criminality such as the abuse of rights, racial discrimination, sexual harassment, theft, burglary, extreme violence, drug dealing
7. **State-Related Police Crime**—Police are used to commit offenses for political purposes

Source: Punch, Maurice, "Police Corruption and Its Prevention," *European Journal on Criminal Policy and Research* **8**: 301-324, 2000.

D. POLICE CORRUPTION

A range of behaviors can be considered police corruption, such as accepting free coffee, accepting a bribe to avoid an arrest, and directly being involved in drug dealing. There are various typologies outlining police corruption [5, 6], but the most comprehensive typology that includes serious abuses of a police officer's position is given by Maurice Punch [7]. The Punch typology defines police corruption in terms of seven categories: misconduct, "conventional" corruption, strategic corruption, predatory corruption, noble-cause corruption, police crime, and state-related police crime. In Punch's typology, misconduct refers to occupational deviance that breaks departmental rules and regulations, such as sleeping on the job, absenteeism, and receiving free "perks." "Conventional" corruption is corruption in which something is done or not done for some reward, usually financial (e.g., bribery, kickbacks, shakedowns, internal payoffs, etc.). Strategic corruption involves police and organized crime entering into an agreement so that illegal activities (drug trade, prostitution, gambling, pornography, etc.) can continue to operate. As a result, the police usually receive a payoff for their

protection. In predatory corruption, police are actively involved in corruption. They extort money and organize the graft. Noble-cause corruption involves corrupt acts performed for just motives. Examples include falsifying testimony, intimidating witnesses, planting evidence, and so on, so that convictions can be secured. In police crime, the police are actively involved in criminality, such as abuse of rights, racial discrimination, sexual harassment, theft, burglary, extreme violence, drug dealing, rape, and murder. The last category of police corruption suggested by Punch is state-related police crime. In this category, the police are used by the state to commit offenses for political purposes, such as assassination of a political rival.

Corruption in Host Nation Police Forces

- Police corruption has many forms, but we are particularly interested in *dysfunctional* police corruption in which the police undermine the rule of law and fail to provide security to the people. Dysfunctional police corruption includes the following:

  Social Corruption – favoritism (ethnic, religious, political)

  Police Crime (drug dealing, human rights abuse, extortion, planting evidence, extreme violence, etc)

  Strategic partnering with organized crime

- If petty corruption ("grease" money, shakedowns, free "perks") is not addressed, it can lead to dysfunctional corruption.

- Police corruption can occur at either a *high level* (officers in position of power and influence) or a *low level* among low-ranking officers.

As discussed, police corruption has many forms. For the purposes of this work, the police corruption of interest is the type that causes dysfunction so that the police undermine the rule of law and fail to provide security to the people. Police corruption that causes dysfunction includes different elements of Punch's typology such as social corruption, police crime, and strategic partnering with organized crime. Although the types of corruption that are included in the dysfunctional category are among some of the more egregious behaviors, other "petty" forms of corruption cannot be ignored. If petty corruption ("grease" money, shakedowns, free "perks") is not properly addressed, it can become systemic and lead to corruption that cause dysfunction throughout the force. Also, when dealing with police corruption, it is not limited to low-ranking officers but can occur and often does occur among high-level officers (those in position of power and influence).

Measuring Police Corruption

- Knowing how much corruption there is and understanding its characteristic is critical toward controlling corruption.
- Measuring police corruption is a challenge since there are very few motives for the people involved to make corruption known.
- It is difficult to measure actual levels of corruption, so the best approach is to rely on estimates based on the following methods:

1. Surveys
   A. Police Officers
   B. Citizens
2. Experiments—Random integrity tests
3. Sociological Field Studies—Case studies
4. Commissions
5. Agency Records
6. Criminal Records

Knowing the extent of corruption and understanding its characteristic is critical in controlling it. However, measuring police corruption is a challenge because very few motives exist for those involved to make it known. For example, police officers involved in corrupt acts have no incentive to report it and jeopardize their jobs. If police officers are aware of corrupt activities of a fellow officer, they may be reluctant to report it for fear of retribution. Police chiefs who recognize that there is a corruption problem among officers might be unwilling to acknowledge the problem out of concern that it will reflect poorly on their leadership. Finally, citizens may or may not report corruption depending on whether they participate in the corrupt act or not. Therefore, it is difficult to measure actual levels of corruption. Although imperfect, the best approach is to rely on estimates based on several methods including surveys of police officers and citizens, integrity tests, case studies, commissions, agency records, and criminal records.

Aspects of Policing that Influence Corruption

- **Nature of Policing**
  - Discretionary power on how and when to enforce law
  - No close supervision—work alone or with a partner
  - Engage with criminality on a daily basis
- **Job Characteristics**
  - Low pay
  - Stress of job
  - Lack of prestige of job/professional culture
- **Police Culture**
  - Suspicion of outsiders ("us vs. them" mentality)
  - Code of silence (blue curtain)
  - Strong bonds of loyalty
  - Socialization of new recruits

No single factor drives police corruption. Traditionally, it has been explained in terms of a few morally defective individuals ("bad apples" in an otherwise healthy barrel) who are not representative of the wider police force. However, after the Knapp Commission [8], which investigated corruption within the New York Police Department in the early 1970s, it was found that police corruption was widespread throughout the police force and was more organizationally based rather than individually based. The results of other independent commissions[2] that investigated police corruption also supported a rotten barrel rather than a rotten apple explanation for police corruption. Based on these findings, it is believed that many factors influence police corruption including the nature of policing, job characteristics, and police culture.

The very nature of policing has elements that can influence police corruption. For example, police officers have discretionary power on how and when to enforce the law, which could provide the opportunity to make decisions based on monetary or other gain

[2] Pennsylvania Crime Commission, 1974 [9]; Mollen Commission in New York, 1994 [10]; Wood Commission in New South Wales, 1997 [11].

rather than on upholding the law. Police officers also work with no close supervision. They either work alone or with a partner out in the field, thereby making it easier to break departmental rules and engage in corruption. Also, police officers engage with criminality on a daily basis, so the opportunity and temptation to participate in corrupt acts is always present.

Job characteristics of policing also influence corruption. If police officers are not adequately paid, they may be more likely to accept a bribe or engage in other corrupt acts to obtain a living wage. The stress of the job can contribute to corruption because the police officers might make poor decisions. The lack of job prestige or the lack of a professional culture can also influence corruption because police officers who do not respect their positions are not interested in upholding professional standards.

Aspects of police culture can influence police corruption and include suspicion of outsiders, the code of silence, strong bonds of loyalty, and the socialization of new recruits. Police may have an "us versus them" mentality in which they are suspicious of anyone who is not a police officer or anyone who challenges police authority, thus developing a sense of solidarity and loyalty among themselves. Their unwritten code of silence, also known as the "blue curtain," prevents reporting of corrupt acts by a fellow officer because it is regarded as a betrayal. The strong bonds of loyalty help to reinforce the code of silence as found in the Wood Commission, which investigated systemic corruption within the New South Wales Police:

> The strength of the code of silence was evident during the Commission hearings. Almost without exception officers approached the Commission initially denied ever witnessing or engaging in any form of corrupt activity. Even with an understanding that police would not be disciplined for failing to report certain forms of corruption, the offer of amnesty and the availability of protection against self-incrimination, officer after officer maintained this stand until presented with irrefutable evidence to the contrary. Each knew the truth, yet the strength of the code, and the blind hope that no one would break it, prevailed. [11]

Lastly, new recruits are socialized to conform to the informal rules of police culture in order to be accepted. They may gradually be introduced to corruption and learn not to report it in order to be part of the group.

Some Counters to Police Corruption

1. **Individual**
   - Vetting New Recruits
   - Training for Professional Standards and Values
   - Professional Development
2. **Job-Related Improvements**
3. **Organizational Structures**
4. **Oversight**
   - Monitoring
   - Investigation
   - Disciplinary Actions
5. **Community Involvement**

Although police corruption cannot be completely eliminated, several countermeasures can be undertaken to try and reduce it. Some countermeasures to police corruption include approaches related to the individual officer such as the vetting of new recruits, training recruits to professional standards and values, and offering professional development. Other areas that could lead to reducing corruption are job-related improvements, such as increased pay, and changes in the organizational structure of policing, such as partner rotation. Oversight changes that could be used to counter corruption include monitoring, investigation, and disciplinary actions. Finally, community involvement can have an effect on fighting police corruption, for example ,by forming by creating "tip lines" regarding police abuses or forming neighborhood organizations analogous to "neighborhood watch" groups to work with the police.

Some Capabilities for Countering Police Corruption (1)

- **Vetting new police recruits**
  - Identify desirable characteristics of candidates
  - Focus recruiting on those with desirable characteristics
  - Identify people, backgrounds, and relationships
  - Detect deception
- **Training for Professional Standards and Values**
  - Instill integrity and honesty
  - Engender personal and professional standards and values, "serve and protect" ethos, esprit de corps, acceptance of authority
  - Understand how U.S. domestic experiences apply to HN police forces
- **Professional Development**
  - Design practical and effective mentoring relationships within HN police force
- **Job-Related Improvements**
  - Understand the characteristics of an effective and desirable work environment
  - Provide effective security for police officers (and their families) through policies, organization, equipment, tactics, and training
  - Establish practical policies concerning hiring, pay, benefits, status, and advancement, which promote loyalty and discourage corrupt practices
- **Organizational Structures**
  - Develop practical assignment policies that impede corrupt practices
  - Cultivate a culture intolerant of corruption

E. CAPABILITIES FOR COUNTERING POLICE CORRUPTION

The chart above identifies capabilities for countering police corruption based on the countermeasures previously discussed. For example, under the countermeasure to vet new police recruits, several capabilities for countering police corruption emerge. These include the capability to identify desirable characteristics of candidates; to focus recruiting on those with desirable characteristics; to identify people, backgrounds, and relationships; and to detect deception. The countermeasure of training for professional standards and values elicits capabilities related to instilling integrity and honesty, to developing a "serve and protect" ethos, to developing esprit de corps, and to accepting authority.

Some Capabilities for Countering Police Corruption (2)

- **Monitoring**
  - Monitor on-the-job activities
  - Design and conduct integrity tests (e.g., "sting" operations)
  - Develop feedback mechanisms for complaints from community
  - Develop feedback mechanisms for reports from fellow police
  - Establish effective evidence control and record keeping
  - Identify and monitor corrupt-behavior indicators (e.g., lifestyle)
- **Investigation**
  - Develop independent, objective internal affairs organizations and procedures
  - Develop independent external investigative organizations and procedures
- **Disciplinary Actions**
  - Develop clear policies regarding penalties for corrupt behavior and consistent objective enforcement procedures
- **Community Involvement**
  - Develop an effective HN police public affairs function
  - Develop community participation programs in support of law enforcement (e.g., anonymous "tip lines," "neighborhood watch" groups)
  - Public awareness

The countermeasure of monitoring lends itself to many capabilities needed for countering police corruption. These include the capability to monitor on-the-job activities, capabilities to design and conduct integrity tests, and capabilities for feedback mechanisms for complaints from the community as well as from fellow police officers. Other capabilities for monitoring are related to establishing effective evidence control and record keeping, and identifying and monitoring corrupt-behavior indicators. Investigative countermeasures yield capabilities to develop independent, objective internal affairs organizations and procedures as well as independent external investigative organizations and procedures. Disciplinary actions lead to capabilities that develop clear policies regarding penalties for corrupt behavior and consistent, objective enforcement procedures. Public outreach and community involvement can lead to a reduction in corruption, and capabilities that enforce these countermeasures include developing an effective HN police public affairs function, developing community participation programs that support law enforcement, for example, anonymous "tip lines" and "neighborhood watch" groups, and finally capabilities to enhance public awareness about corruption.

Necessary Conditions for Effectively Implementing the Rule of Law

- If the police force leadership has the *intention* of establishing the rule of law:
  - Then *all* of the capabilities listed on the previous two charts can contribute

- If the police force has corrupt leadership:
  - Then improving *internal* capabilities only empowers the corrupt element
  - Only a higher governmental authority (e.g., governmental leaders or judiciary) with the *intention* and *capability* can effectively implement the rule of law
  - In this case the *external* capabilities will dominate such as:
    - Investigation by external government committees or public "watchdog" groups
    - Interviews, auditing of records, monitoring activities, stings...

(See Annex A for a more detailed discussion of how the likelihood of the establishment of the rule of law depends on the intentions and capabilities of the law enforcement organization and the political and security interests of the community it serves.)

Two main scenarios govern the applicability of various types of counter-corruption capabilities. The first is when the police force leadership has the *intention* of countering corruption within its ranks, and the second is when that leadership itself is corrupt and has no intention of establishing the rule of law. In the first case, all of the capabilities being discussed can apply, but in the second case, only the capabilities that are available to authorities external to the police force apply. These include capabilities to conduct investigations both within the police organization and within the community it serves; to open up police activities to "watch dog" groups such as an international organization or a free press; to audit and analyze records; to monitor activities; and to conduct undercover operations.

Annex A contains a discussion of how the likelihood of the establishment of the rule of law depends on the intentions and capabilities of the law enforcement organization and the political security interests of the community it serves.

Some Directions for S&T Initiatives (1)

Vetting New Police Recruits

- **Identify desirable characteristics of candidates**
  - (*Psychological/Social)* Create psychological profiles to determine characteristics; develop questions/tests for personalities
  - *(Hard technology)* Create faster way to do background checks, software to assimilate findings, databases to store background findings, social network mapping tools
- **Focus recruiting on those with desirable characteristics**
  - *(Psychological/Social)* Design surveys to identify where to recruit; understand how to market or advertise to those with desirable characteristics
  - *(Hard Technology)* Create databases for biographical info
- **Identify people, backgrounds, and relationships**
  - *(Psychological/Social)* Understand different relationships in a society (e.g., familial, tribal, etc)
  - *(Hard Technology)* Create biometrics, databases, registration, social network mapping tools, other metrics
- **Detect Deception**
  - *(Psychological/Social)* Understand the "art" of questioning and types of questions to ask
  - *(Hard technology)* Institute facial expression recognition, polygraphs

F. DIRECTIONS FOR SCIENCE AND TECHNOLOGY INITIATIVES

Directions for science and technology initiatives can be classified according to the different capabilities they address. As stated previously, the use of the term "technology" not only refers to devices, hardware, or tools but also encompasses a broader context to include methods of organization, systems, applications of psychological and social sciences, and techniques. The S&T directions aimed at improving the capabilities fall into one of three categories: psychological/social, hard technology, and organizational directions. Often, a capability will lead to technology initiatives in more than one of the categories. For example, for the countermeasure of vetting new police recruits, one capability is to be able to identify desirable characteristics of candidates. S&T initiatives that emerge from this capability fit into psychological/social and hard technologies. The psychological/social initiatives include developing psychological profiles to determine the characteristics that make a "good" police officer, developing appropriate questions, and testing for personalities. Hard technology initiatives include developing a faster way to conduct background checks, developing software to assimilate findings, developing databases to store background findings, and developing social network mapping tools to

identify friends and associates. The social networking mapping tools could also potentially be used to identify other recruits.

Directions for S&T initiatives have been identified for the other capabilities related to vetting new police recruits, as indicated in the chart above. The S&T initiatives for recruiting candidates with desirable characteristics concern identifying possible recruits, such as through surveys or marketing and advertising and using databases to store biographical information. For the capability to identify people, background, and relationships among people, the technologies also lead to the use of databases, as well as biometrics, registration, social networking tools, other metrics, and the ability to understand different relationships in a society. Under detecting deception, the S&T directions that could enable this capability include facial expression recognition, polygraphs, and understanding the "art" of questioning and the types of questions to ask.

Some Directions for S&T Initiatives (2)

Training for Professional Standards and Values

- **Instill integrity and honesty**
  - (*Psychological/Socia*l) Understand the process by which one can change the thinking of someone; reinforce certain ways of thinking
  - (*Organizational*) Understand how to create an environment of honesty and integrity through leadership
- **Engender personal and professional standards and values, "serve and protect" ethos, esprit de corps, acceptance of authority**
  - *(Psychological/Social*) Identify how to build positive relationships and team trust; how to get people to care about the community
  - (*Organizational*) Determine effective techniques for leadership to set example
- **Understand how U.S. domestic lessons learned apply to HN police forces**
  - *(Psychological/Social)* Understand how experiences in one culture relate to other cultures
  - (*Organizational)* Identify U.S. domestic lessons learned regarding training programs and how they relate to the HN organizational approach

S&T initiatives for capabilities associated with training for professional standards and values are listed above. For these S&T directions, we identified no hard technologies but rather give psychological/social and organizational directions. One of the first places to address corruption is in the ethical training of new recruits. A capability that addresses this countermeasure is instilling integrity and honesty in recruits, and an S&T initiative is to understand the process of changing someone's thinking. This challenge may be similar to the one in U.S. basic training for military personnel in which people are "re-trained" to think and behave differently than the way in which they are accustomed. Another S&T initiative would be to understand how to reinforce certain ways of thinking so that "right" thinking is encouraged and "wrong" thinking is discouraged.

For the capability to understand how U.S. domestic lessons learned apply to HN police forces, it is important to recognize that lessons learned in the United States may not apply to the HN because of differences in cultures and attitudes. Thus, it is important to have an S&T initiative aimed at understanding how experiences in one culture relate to other cultures. Along similar lines, an organizational technology initiative would be to identify U.S. domestic lessons learned regarding training programs and to understand how they relate to the HN organizational approach.

Some Directions for S&T Initiatives (3)

Professional Development

- **Design practical and effective mentoring relationships within HN police force**
  - *(Psychological/Social*) Identify how to match personalities for mentoring
  - (*Hard technology*) Determine metrics that gauge effective mentoring systems
  - *(Organizational*) Determine best practices for businesses and other organizations that use mentoring and understand how they translate to HN

Job-Related Improvements

- **Understand the characteristics of an effective and desirable work environment**
  - *(Organizational)* Develop strong leadership
- **Provide effective security for police officers (and their families) through policies, organization, equipment, tactics, and training**
  - *(Hard technology)* Use cell phone plus technology incorporating GPS and sensor application
- **Establish practical policies concerning hiring, pay, benefits, status, and advancement which promote loyalty and discourage corrupt practices**
  - *(Hard technology)* Use cell phone technology for secure financial transactions

Organizational Structures

- **Cultivate a culture intolerant of corruption**
  - *(Organizational)* Develop zero tolerance corruption policy; comparative studies with other organizations that also have corruption challenges (e.g., gambling); understand how corruption spreads; understand characteristics of corrupt organizations

For the countermeasure of professional development, a capability is to design practical and effective mentoring relationships within the HN police force. An S&T initiative associated with this capability is to identify how to match personalities for mentoring. Arbitrarily assigning a person to a mentor might not lead to an effective mentoring relationship because of the lack of "chemistry" between the people. This could result in the mentee feeling uncomfortable around the mentor and an unwillingness to talk openly and freely. Another S&T initiative for professional development is determining metrics that gauge an effective mentoring system. These metrics could be related to the professional growth of the mentee or the compatibility of the relationship, for example. An organizational initiative is to determine the best practices for businesses and other organizations that use mentoring and to understand how they translate to the HN police force.

The countermeasure of job-related improvements requires capabilities to understand characteristics of an effective and desirable work environment. An organizational S&T initiative is to develop strong and corruption-free leadership, which will motivate police officers to do their jobs and promote a police culture intolerant of

corruption. Another capability for job-related improvements is providing effective security for police officers and their families through policies, organization, equipment, tactics, and training. A hard technology initiative for this capability is the use of cell phones, which provide security to police officers by allowing basic communication with one another. The security of the police officers can be further enhanced through cell-phone use by incorporating advanced technology, such as GPS. If GPS is installed on a cell phone, then the police officer's location can be known. An additional cell-phone technology that could improve officer security is one that creates an ad hoc mesh network so that police officers can remain in contact with each other even if no cell phone towers are present. For example, the towers could have been destroyed or perhaps the infrastructure does not yet exist in the region. Finally, a third technology makes use of sensors that can be placed remotely, for example, on a police vehicle; then the phone can read the sensors, which would indicate whether the vehicle has been tampered with.

An additional capability for job-related improvements is to establish practical policies concerning hiring, pay, benefits, status, and advancement, which promote loyalty and discourage corrupt practices. The cell phone could be used again to enhance this capability by incorporating technology that allows for secure financial transactions so that payments are received. In Afghanistan, police officers often do not receive their full pay because money is skimmed off; however, this technology would ensure that police officers receive their full pay. If this technology is combined with biometrics, it could be used to verify that the police officer who is supposed to receive the funds is the correct person.

Some Directions for S&T Initiatives (4)

Monitoring

- **Monitor on-the-job activities**
  - *(Psychological/Social*) Understand psychological aspects of monitoring; understand how to monitor while avoiding a "Big Brother" environment
  - (*Hard technology*) Track people, vehicles, and weapons; surveillance; communication/phone tracking, financial tracking
- **Integrity tests**
  - *(Psychological/Social*) Understand the "art" of sting operations, for example, how to design a test so that police won't know it's a sting operation
  - (*Hard technology*) Remotely trace money
- **Feedback mechanisms from coworkers or the community**
  - (*Psychological/Social)* Understand how to encourage people to provide information
  - *(Hard Technology)* Anonymous tip line
  - (*Organizational)* Develop reporting policy—must report incident if known about
- **Identify and monitor corrupt-behavior indicators**
  - *(Psychological/Social*) Identify lifestyle indicators (individual level)
  - (*Hard technology*) Monitor phone traffic; monitor financial transactions; metrics for measuring corrupt behavior
  - (*Organizational)* Identify indicators of corrupt promotion practices (organizational level)

Another area for counter-corruption S&T initiatives is in oversight of the police force. One oversight capability is monitoring on-the-job activities. To do this, one needs to understand the psychological aspects of monitoring. There needs to be a balance of sufficient monitoring to understand if actions and procedures are being followed without creating the negative aspects of a "Big Brother" environment, resulting in distrust and heavy-handed disciplinary actions. Hard technologies associated with monitoring on-the-job activities are initiatives related to tracking people, vehicles, weapons, telephone communications, and money. For example, cell phones with the appropriate technology could be used to monitor phone conversations or, with GPS installed, could provide geolocation to provide information on whether a police officer is in an inappropriate area.

Integrity tests, in which a police officer is placed in a deceptive situation to see if he will commit any wrongdoing, are an essential aspect of oversight to countering police corruption because they provide insight into an individual's honesty, dependability, trustworthiness, and reliability. S&T could enable integrity tests by providing understanding of the "art" of sting operations. A hard technology that can be used for integrity tests is remotely traceable money so that the financial transactions of police officers can be monitored.

A third capability to support oversight countermeasures is a feedback mechanism for coworkers or the community so they can report instances of corruption. Often, citizens or fellow police officers are the best source concerning police corruption, but they do not report it for fear of retribution or intimidation. S&T could improve this reporting by providing a means to encourage people to come forward and to give information regarding corrupt acts. A hard technology that could promote feedback from both the community and coworkers are anonymous tip lines. An organizational initiative to encourage fellow police officers to report police corruption is to develop specific policy. For example, if a police officer knows about the corrupt acts of another officer, then policy could mandate that the police officer must report the incidents if he knows about them. Otherwise, if it is found afterward that he knew about the corrupt acts, then he is equally as culpable as his corrupt fellow officer.

A fourth capability that lends itself to oversight is identifying and monitoring corrupt-behavior indicators, which can apply at either the individual or organizational level. At the individual level, S&T directions that could identify unusual lifestyle indicators would be useful. Hard technologies that would support monitoring corrupt-behavior indicators include techniques to monitor phone traffic, techniques to monitor financial transactions, and metrics for measuring corrupt behavior. S&T directions at the organizational level include identifying indicators of corrupt promotion practices, such as non-merit-based decisions that may indicate nepotism, cronyism, or exchange favors.

Some Directions for S&T Initiatives (5)

Investigation

- **Develop independent, objective internal affairs (IA) organizations and procedures**
  - (*Psychological/Social*) Understand how to investigate groups
  - *(Hard technology*) Use anonymous tip lines
  - *(Organizational*) Understand best practices to create an effective IA; understand rotational position policy; understand how to keep IA from being corrupt; understand best practices for interviewing people; look into studies on manifestations of corruption
- **Understand how to foster the role of the press and investigative reporting**
  - *(Organizational)* Understand the role of the press in Western countries and how it can be implemented in HN
  - *(Hard technology)* Foster websites hosted by newspapers to anonymously discuss corruption in HN

Disciplinary Actions

- **Develop clear policies regarding penalties for corrupt behavior and consistent, objective enforcement procedures**
  - *(Organizational)* Understand best practices of other businesses and organizations for developing effective policies and procedures

An investigative countermeasure capability is to develop independent, objective internal affairs (IA) organizations and procedures. An IA organization investigates complaints of police misconduct in a fair and impartial manner. An S&T initiative that could enable this capability is to develop an understanding of how to investigate groups. Another initiative is to setup anonymous tip lines so the public or fellow police officers can report incidents of police corruption. Other S&T initiatives include understanding best practices to create an effective IA organization (such as rotational assignments), determining how to prevent IA from becoming corrupt, developing best practices for interviewing people during investigations, and identifying manifestations of corruption.

An essential element to countering corruption is the role of an investigative press, and a capability associated with this is to understand how to foster the role of the press and investigative reporting. An S&T initiative is to understand the press' role in countering corruption in Western countries and how it can be implemented in the HN. Another initiative involves the use of the Internet to create websites hosted by news organizations that allow for anonymous discussions on corruption.

Disciplinary actions can also be an effective way of dealing with corruption, and an important capability is to understand how to develop clear policies regarding penalties for corrupt behavior and consistent, objective enforcement procedures. A technology that fosters this capability is to understand best practices of other businesses and organizations for developing effective policies and procedures. For example, in the business world, often a company will have a mission statement, code of ethics, and clearly posted rules and regulations, which could be similarly adopted by police forces.

Some Directions for S&T Initiatives (6)

Community Involvement

- **Develop an effective HN police public affairs function**
  - *(Psychological/Social)* Understand how the community views police and vice versa
  - *(Hard Technology)* Develop effective metrics
  - *(Organizational)* Create comparative studies and best practices
- **Develop community participation programs in support of law enforcement**
  - *(Psychological/Social)* Understand the design of participation programs (e.g., youth activities)
  - *(Hard Technology)* Create systems for anonymous tip lines
  - (*Organizational)* Understand how to design effective "neighborhood watch" programs
- **Public Awareness**
  - *(Psychological/Social*) Understand how public education can raise awareness of corruption; understand how to change public opinion if public accepts corruption; understand how to design an anti-corruption campaign
  - (*Organizational)* Understand how to make police organizations and processes more transparent to public

The last countermeasure for dealing with corruption in HN police forces is community involvement. A possible capability for improving community involvement is to develop an effective HN police public affairs function. A public affairs function is meant to build a mutually supportive relationship between the public and the police department. Several S&T initiatives could be applied to building such an organization. The first is to understand how the community views police officers and vice versa. The second is to develop effective metrics. A third initiative is to undertake comparative studies and best practices and incorporate them.

Another capability that could enhance community involvement is to develop community participation programs in support of law enforcement. Programs could, for example, include youth sports. An S&T initiative that could lead to this capability is to understand the design of participation programs. Other technologies include providing systems for anonymous tip lines to report police misconduct and understanding how to design effective "neighborhood watch" programs in which the public can help be the "eyes" and "ears" for the police. S&T directions that could enhance public awareness include raising awareness of police corruption through public education, understanding

how to design an anti-corruption campaign, and understanding how to change public opinion if the public already accepts corruption. In some cultures, aspects of corruption are an accepted part of society, so an understanding of how to make them unacceptable is needed. Another technology that can improve public awareness is to make police organizations and processes more transparent to the public.

Countering Corruption in HN Police Forces: Innovation Business Partners, Inc. (IBP) Approach

- IBP, with assistance from the Kiernan Group and IDA, conducted a complementary effort to identify technologies to counter corruption in HN police forces with particular emphasis on Afghanistan
- Report: Innovation Business Partners, Inc., "Countering Corruption in Host Nation Police Forces," Lavallette, NJ, October 2008

Approach:

- Two workshops held at IDA with 13 law enforcement experts identified by The Kiernan Group to address the problem
- First workshop identified 4 critical challenges to police corruption:
  1) Leadership
  2) Professional Police Culture
  3) Authority Structure
  4) Transparency and Accountability
- IBP conducted patent search on critical challenge areas
- Second workshop focused on Professional Police Culture and subdivided area into 5 elements:
  1) Security of Police Officer
  2) Training and Mentorship
  3) Living Wage
  4) Recruiting and Screening
  5) Internal Affairs
- Individual patents and combinations of patents identified for technology solutions to 5 sub-elements of Professional Police Culture

G. INNOVATION BUSINESS PARTNERS, INC. (IBP) APPROACH

In a complementary effort to this report, IPB, with assistance from The Kiernan Group, conducted two workshops at IDA aimed at identifying specific technologies that would support counters to corruption in HN police forces, with a particular emphasis on Afghanistan. Whereas this report describes the broad structure of capabilities and directions for countering corruption, IBP's effort focused on a narrower part of the landscape. The results of that effort are briefly summarized here. For a complete description, see Reference 12.

To identify technologies, IBP used its IP Driven Innovation™ approach. The approach consisted of two workshops in which a group of subject matter experts (SMEs) convened to address the problem. The first workshop was attended by 13 SMEs consisting of current and former U.S. and Afghan law enforcement personnel as well as active-duty military personnel who had recently served in Afghanistan. During the first workshop, the SMEs defined the problem of police corruption and identified four critical challenge areas: leadership, professional police culture, authority structure, and transparency and accountability. After the first workshop, with these four critical

challenge areas identified, IBP conducted a patent search on the critical challenge areas across various domains.

The purpose of the second workshop was to focus on one of the critical challenges; the SMEs decided the most important challenge was in the area of professional police culture. The SMEs subdivided the professional police culture area into five sub-elements and ranked them according to priority. From highest to lowest priority, these were security of the police officer, training and mentorship, living wage, recruiting and screening, and internal affairs. The SMEs then looked at individual patents selected by IBP as well as combinations of patents to come up with short- and long-term technology enablers for the sub-elements.

Countering Corruption in HN Police Forces: IBP Results of Technology Search (1)

Security of the Police Officer
Short-term: 1) Cell phone operation without cell tower
2) Cell phone acts as mobile sensor network
3) GPS tracking system on cell phone

Long-term: 1) Enhanced "911" system for cell phone
2) Radio frequency identification sensors

Training and Mentorship
Short-term: Video and DVD training, especially for firearms
Long-term: Online system to develop literacy skills

Living Wage
Short-term: Technology to enable secure financial transactions using a cell phone
Long-term: Software system to help manage lifestyle changes

For the sub-element of security to the police officer, three short-term technology solutions were identified. The first invention allows cell phones to maintain voice and data communications without a cell tower, thus, police officers could remain in contact with one another if something happened to the cell tower, which has often been the object of Taliban attacks in Afghanistan. The second patent turns a cell phone into a platform for a mobile sensor network. It was commented during the second workshop that these two inventions could be combined to create a mobile sensor and communication network. The third invention was a GPS tracking system on cell phones that could determine if a person varies from a predetermined operational plan. Furthermore, the technology has an alert capability for emergency assistance from law enforcement personnel.

Two inventions were found to be applicable to long-term technology solutions for police officer security. The first patent pertained to an enhanced "911" system for cell phones. The system identifies the location of every cell phone in the network, so that if a "911" call is placed, the cell phone caller and nearest neighbors can be identified. This system would benefit police officers because it could be used to alert the closest police officers to another police officer who is in trouble. The second invention makes use of

radio frequency sensors that can be placed wherever desired, and then the sensors are read by a cell phone. IBP thought that this invention would provide great utility for police officer security and cited an example in which sensors could be placed on a police car, which would alert the police officer if anyone had tampered with the vehicle.

Short-term technology solutions for training and mentorship of police officers were related to video and DVD training. The SMEs particularly thought training should focus on firearm usage. Toward this end, IBP identified that the Nintendo Wii Zapper could be used for firearm training along with other Nintendo accessories such as the Wii Sharp Shooter and the Wii Sports Pack.

The discussion on long-term solutions for training and mentorship was related to basic literacy. The SMEs stressed that most of the Afghan population is illiterate, and any technology that could improve literacy and help make training easier would be an asset. IBP suggested a patent for an online system to develop literacy skills by connecting learners, teachers, and mentors.

For the living wage sub-element, a short-term technology solution is a patent that enables secure financial transactions using a cell phone. Some Afghan police officers must travel a few days to the bank to verify that they are the recipient of electronically transferred funds, so this technology would eliminate the need for travel. The SMEs also thought this technology could be coupled with the patent mentioned above to turn a cell phone into a platform for sensors. This combined technology would enable biometric verification that the person being paid is the correct police officer. A long-term technology solution for the living wage sub-element is a software system to help manage lifestyle changes. This system would be particularly useful in trying to change corrupt behaviors.

Countering Corruption in HN Police Forces: IBP Results of Technology Search (2)

Recruiting and Screening

Short-term: 1) Method for extracting relevant information from a group of documents
2) System and method to identify, recruit, and enroll influential members of various social groups

Long-term: No specific technology identified

Internal Affairs

Short-term: 1) Self-authenticating badge
2) Method and system for automatic recognition of deceptive language
3) System and method that searches context of a call for keywords
4) Cell phone acts as mobile sensor network
5) GPS tracking system on cell phone
6) Technology to predict intent
7) Layered graphical event mapping

Long-term: Multi-organizational information management system

For the sub-element of recruiting and screening, two short-term inventions were found. The first invention is a method for extracting relevant information from a group of documents related to a target group and allows a message to be created that focuses on the extracted information. This invention would be useful for recruiting police officers because it would generate a specially designed message to attract recruits. The second invention is a system and method to identify, recruit, and enroll influential members of various social groups. By recruiting influential members of social groups, it would hopefully be easier to attract others from the same social groups.

No specific technology was identified for long-term technology solutions for recruiting and screening. Instead, the SMEs addressed areas where technology could be applied, such as in recruiting, conducting a public relations campaign, identifying core police values, and improving literacy skills.

Seven short-term technologies were identified for the internal affairs sub-element. The first technology is a self-authenticating badge that uses biometric identification. It is believed that the badge would contribute to accountability and a more professional police culture. Another technology is a method and system for recognition of deceptive written

communication. This technology could be used to help identify a corrupt police officer through written statements. Another invention that relates to communications is a system and method that searches the content of a call to identify keywords and sends the message to law enforcement. Again, this technology could help identify corrupt individuals by monitoring telephone traffic. Two other patents for short-term solutions to internal affairs have already been recommended for the police security sub-element. One is an invention that converts a cell phone into a mobile sensor network. The other is a GPS-based tracking system on cell phones. If these two inventions are combined, they would provide the capability to track and analyze the behavior of police officers and therefore help identify corrupt behavior. A sixth technology could be used to identify corrupt intention by recognizing sequences of events or patterns of behavior. The last short-term technology for internal affairs is one aimed at organizing, analyzing, and visualizing vast amounts of data that might be collected by internal affairs.

For a long-term technology solution for internal affairs, IBP referenced an invention that consists of a multi-organization information management system. The invention allows data to be shared securely between various organizations.

For a complete discussion of the IBP effort, see Reference 12.

Summary

- Corruption in HN police forces is a critical dimension of irregular warfare.
- The fundamental challenge is to develop an organization of HN individuals who have the intent and capability to establish and maintain the rule of law.
- A prerequisite for meeting this challenge is a legitimate HNG ,which is itself not corrupt and seeks to establish the rule of law.
- There is no single innovation for preventing corruption—an integrated program addressing all facets is needed.
- S&T can play an important role in support of anti-corruption initiatives.
- This study has described the structure of the counter-corruption challenge, identified the range of capabilities needed, and suggested a number of promising directions for S&T initiatives.
- Specific technologies identified in the parallel effort by IBP, Inc., and The Kiernan Group are consistent with the results of this review, which focused on identifying capabilities.

H. SUMMARY

Corruption in HN police forces is a critical challenge for IW efforts. It is important to counter corruption in HN police forces in order to establish the rule of law and to provide for a stable society. However, to counter corruption in HN police forces, a legitimate HNG, which is not corrupt and seeks to establish and enforce the rule of law must exist.

There is no single solution for preventing corruption in HN police forces. Instead, an integrated program must address all facets of the problem. Toward this end, S&T can play an important role in the support of anti-corruption initiatives, especially in the areas of understanding and shaping the psychological, social, and economic forces that underlie corruption, developing organizational structures and policies, and using "hard" technologies as systems and equipment for counter-corruption actions. S&T initiatives that would be high priority to pursue are either initiatives that are fundamental to all capabilities or initiatives that have cross-cutting applications for several capabilities. For example, an application of social science that is essential to all capabilities is being able to assess the extent of police corruption among the HN police forces. It is necessary to

know how entrenched police corruption is among the forces before deciding which capabilities would be needed to counter it. Another application of social science that applies to all capabilities is translating cross-cultural experiences. Although the lessons learned for U.S. police forces are often applicable to other Western police forces, they may not apply in the HN because of differences in cultures and attitudes. Therefore, it would be useful to be able to relate how experiences in one culture translate into another. This might involve using case studies, best practices, or other metrics. An example of an S&T initiative that has cross-cutting applications for many capabilities is leveraging cell phone technology.

In summary, this study has described the structure of the counter-corruption challenge, identified the range of capabilities needed, and suggested a number of promising directions for S&T initiative. The specific technologies identified in the parallel effort by IBP, Inc., and the Kiernan Group are consistent with the results of this review.

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ORGANIZATIONS CONCERNED ABOUT CORRUPTION

International Monetary Fund
http://imf.org

The Organization for Economic Cooperation and Development
http://www.oecd.org

Transparency International
http://www.transparency.org

United Nations
http://www.un.org

U.S. Agency for International Development
http://www.usaid.gov

The U.S. Department of Commerce
http://www.ita.doc.gov/legal

The U.S. Office of Government Ethics
http://www.usoge.gov

The U.S. State Department (Office of Inspector General)
http://www.state.gov/www/dep/oig/index.html

The World Bank
http://www.worldbank.org

World Trade Organization
http://www.wto.org

Annex A

HOW LOCAL ATTITUDES AND SECURITY CONDITIONS INFLUENCE THE ESTABLISHMENT OF AN EFFECTIVE POLICE FORCE

Annex A
HOW LOCAL ATTITUDES AND SECURITY CONDITIONS INFLUENCE THE ESTABLISHMENT OF AN EFFECTIVE POLICE FORCE

This annex focuses on the challenges in an IW campaign to counter police corruption and to establish an effective professional HN police force. Afghanistan and the Afghanistan National Police (ANP) are the context in this annex for the concepts and capabilities that need to be used to develop the campaign to make this possible.

Section A reviews the current situation in Afghanistan and describes the difficulties in countering the systemic sources of police corruption that are not major problems in 21st century U.S. policing. Section B describes concepts for understanding and responding to local conditions (i.e., the policing environment and the surrounding human environment in which it is embedded) and shows how they point to both the actions needed in a campaign to support an effective professional police and to the priorities in the face of limited resources.

A. THE CURRENT ANP SITUATION

The goal for the ANP, according to the Combined Security Transition Command–Afghanistan (CSTC-A), is "an effective and efficient police force that is capable, professional, well-trained, and committed to public service." In June 2008, the Bush Administration sent to Congress the first annual report, "United States Plan for Sustaining the Afghanistan National Security Force." This report covers the U.S. long-range plans for both the Afghanistan National Army (ANA) and the Afghanistan National Police (ANP).

The improvements planned for the ANP include an end-state of 82,000 people; improved training (initial and field, the Focused District Development Program); equipment; readiness and assessment tools; building and sustaining the Officer Corps; merit-based rank, promotion, and salary reform (including pay equality with ANA);

mechanism for incorporating lessons learned and best practices; and oversight mechanisms.

The importance of an effective professional police force—and difficulty in obtaining it—is evident in General Barry McCaffrey's report on his visit to NATO SHAPE HQ and Afghanistan, 21-26 July 2008. In addressing criteria for winning in Afghanistan he says: "The battle will be won in Afghanistan when there is an operational Afghan police presence in the nation's 34 provinces and 398 districts." But he points to problems in governance: "The Afghan government at the provincial and district level is largely dysfunctional and corrupt." And he's clear about the danger to police in Afghanistan today. Of all friendly forces killed-in-action from January 2007 to July 2008, 59 percent are ANP, 21 percent are ANA, and 20 percent are coalition. The CSTC-A has identified other dangers to the ANP, beyond high risk of being killed in action, as "increasing insurgency threats to ANP family members" and "hostility of populace toward police in the south and southeast."

A major ANP weakness identified by the CSTC-A is corruption. Why should corruption still be a critical ANP problem, given that 6 years have passed and $6 billion has been invested in the ANP since the overthrow of the Taliban regime? To understand this question, the systemic sources of police corruption in Afghanistan—money, coercion, and culture—have to be understood.

Money and Bribery—Most Afghan police are not paid a living wage. Drug lords and criminals are able to give them the money they need in return for favors. People with good intentions may still join the ANP—good jobs are hard to find—but getting food and shelter for one's own family certainly competes strongly with a police ethos of protect and serve all the people. Reforms in rank and pay introduced in 2008, providing ANP compatibility with the ANA, will help recruit and retain qualified police. But to counter this source of corruption, police will have to be paid a living wage (plus benefits for family health care, retirement, and death).

Coercion from Threats—Police and their families are the targets of threats and violence. Policing can be a dangerous business, with many sources of coercion by the threat of violence: tribes, religious groups, criminals, drug lords, ethnic groups. The need to protect one's family from harm certainly competes strongly with a police ethos of protect and serve all the people. To address this source of corruption, the ANP and coalition have to provide

security for the local police and their families—which really means security for all people in that province or district.

Culture—Police respond to the local cultural norms in their society. Cultural norms that dictate loyalty to one's ethnic or religious group certainly compete strongly with a police ethos of protect and serve *all* the people—unless all the people in a particular province or district are from the same ethnic or religious group. To address this source of corruption, the local ethnic and religious authorities have to strongly, publicly, and repeatedly urge their followers who are in the ANP to give priority to an ethos of serve and protect *all* the people.

Given the strength of the systemic sources of police corruption, it shouldn't be surprising that—after 6 years and $6 billion invested—corruption is still a major ANP problem.

B. UNDERSTANDING THE LOCAL ENVIRONMENT

Afghanistan does not have a homogenous environment for policing. While the goal is for the ANP to be an effective professional force throughout the country, the actions that need to be taken by the coalition and the Afghan government to make it happen clearly depend on local conditions—one size won't fit all.

In any country fighting an insurgency, a wide range of local policing environments can be present in different parts of the country. Some provinces, districts, and cities may have a professional and effective police force; others may have a weak one—or even no force at all; still others may have a police force that is just another criminal gang. Not only do actions need to be tailored to local conditions, but a priority for these actions needs to be set—because resources are always limited and everything cannot be done simultaneously. All of these issues are the focus of this part of the annex.

Concepts are presented below for mapping and understanding the local environment. The first focuses on the local policing environment; the second focuses on the human environment in which it is embedded.

1. Understanding the Local Policing Environment

The policing environment in any province, district, or city can be characterized in several ways. Three commonly used ways are summarized below. The most useful characterization is one that helps to identify the actions that the coalition and HNG should take to support an effective professional police force.

1. The policing environment is often characterized in terms of its two basic inputs: the *human part* (e.g., the number of people, their education and training, their age and experience) and the *physical part* (e.g., their facilities, vehicles, communication systems, and individual equipment). This characterization is relatively simple to assess. It is often used where U.S. efforts to improve the HN police focus on these inputs, namely recruiting and training police, and providing them with the facilities and equipment they need. But this characterization does not say much about the output, namely how much effectiveness (or corruption) to expect from the police organization, or the actions needed to improve the output.
2. The policing environment can be characterized in terms of its two basic human levels: *leadership* and the *rank-and-file*—for example, the number, rank, ethnic and/or religious affiliation, and ethos of each level. This characterization is harder to assess than simply using inputs. It has the value of recognizing that there is both a political and an operating level, that for cultural and other reasons they can be different in their effectiveness and limitations, and that the challenges in countering corruption can be different for each. But this characterization still does not say much about the effectiveness and corruption to expect, or actions to deal with it.
3. The policing environment can be characterized by terms the U.S. military uses for all military forces: their *intentions* and *capabilities*. *Intentions* refer to whether or not they want to provide an effective professional police force; *capabilities* refer to whether or not they could provide an effective professional policing if they so desire. Lack of intentions for an effective professional force could come from several sources of corruption: (1) bribery of police by criminals and drug lords; (2) coercion of police by insurgent threats against police and their family; (3) a culture that expects and/or tolerates police not having an ethos of "serve and protect all the people." This characterization is harder to make, because both intentions and capabilities depend on specifics of the human and physical part of the force, as well as on the characteristics of the leadership and the rank-and-file.

This last characterization is just what is needed to understand the local policing environment in a way that points to the actions needed for an effective professional HN police force. So, in this annex, the policing environment is characterized—in a crude but still useful way—by a 2x2 matrix, as shown in Figure A-1 below. The vertical dimension is defined by whether or not the *intention* of the police is to provide an effective professional force that is committed to an ethos of serving and protecting the people. The horizontal dimension is defined by whether or not the police have the *capability* to do so.

This matrix sets up four situations for the policing environment, shown in the 2x2 matrix, and summarized below.

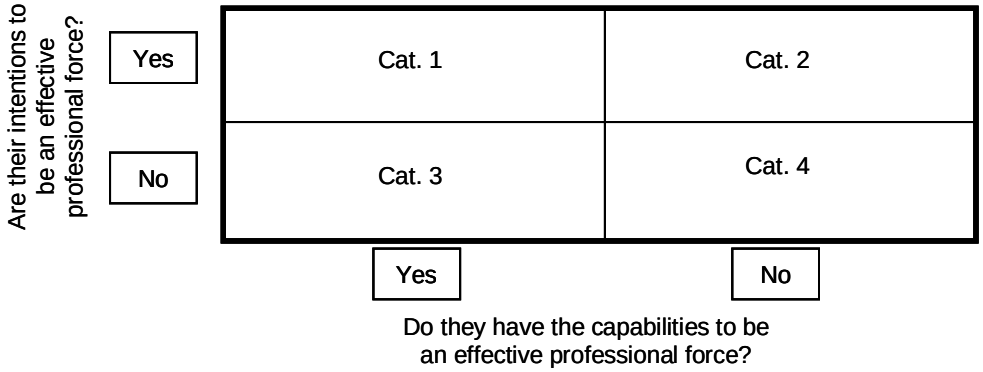

Figure A-1. Policing Environment 2x2 Matrix

1. Police have the intention and the capability to serve and protect the people. This is the best situation and any HNG/coalition actions taken would be designed to reinforce it.
2. Police have the intention, but not the capability, to serve and protect the people. This is a situation in which the provision of inputs (human and physical) could make a major difference in capability—and so in the effectiveness of the force.
3. Police do not have the intention to serve and protect the people, but do have the capability. This is a situation that demands leadership by the HN authorities (formal political leaders and informal figures of authority) to change the policing ethos. Depending on the underlying source of corruption that drives the lack of intention, the HNG could have to provide better salary and benefits to police to reduce their vulnerability to bribery, and/or provide better protection to the police and their families against coercive threats, and/or press for a change in a culture that tolerates not putting first the needs of all the people.
4. Police do not have either the intention or the capability to serve and protect the people. This situation offers nothing to build on. It calls for leadership by HN authorities to change the policing ethos and HNG/coalition actions to rebuild the police from scratch.

Clearly, each situation puts a different demand on the United States and HNG to create and sustain an effective professional police force. As will be seen below, the local human environment will also affect what should be done. But first we need to

characterize the local human environment within which the policing environment is embedded.

2. Understanding the Local Human Environment

The local human environment, within which the local policing environment is embedded, is characterized here—again, in a crude but useful way—by the 2x2 matrix shown in Figure A-2.[1] This concept is extensively described in a recent IDA report [13]. The vertical dimension is defined by whether the people favor the HNG and the coalition to prevail or favor insurgents (one group or possibly several). The horizontal dimension is defined by whether the people see their security as currently being provided by the HNG/coalition or by insurgents. This matrix sets up four situations for the human environment, as shown in the 2x2 matrix and summarized below.

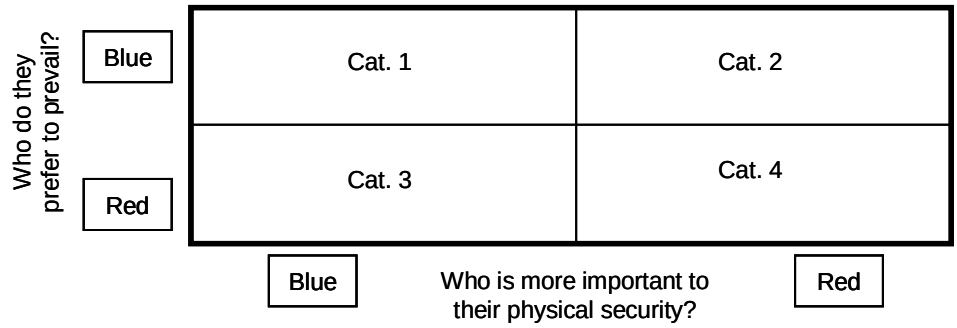

Figure A-2. Human Environment 2x2 Matrix

1. The best situation for the HNG/coalition is where the people favor the HNG/coalition to prevail and see their security provided by the HNG/coalition (box 1). Here the challenge is to fully transition security to the HNG in a relatively friendly human environment. For the coalition, these security situations should be seen as calling for economy-of-force security operations. But these situations could have high priority for policing resources. The same judgments apply here as in the situation described just above.
2. In situations where the people favor the HNG/coalition to prevail but see their security as provided by insurgents (box 2), the HNG and coalition face a time-urgent challenge. This part of the human terrain is relatively unstable. It would be easy for the local people to feel abandoned by the HNG and turn their allegiance to the insurgents if nothing is done about this situation. Thus,

[1] This mapping of popular attitudes was introduced by Janine Davidson, Mark Smith, and Peter Brooks of SAIC/Hicks & Associates in 2005 and developed further in Reference 13.

if this situation isn't turned around quickly, it will degenerate into the stable—and very hard to change—situation of box 4. So this situation should have the highest priority for security forces. When HNG/coalition security forces are allocated to this part of the human environment, how they are used should be sensitive to the policing environment:

- If police have good intentions and capabilities, then the HNG/coalition actions should avoid attacks on police, their facilities, and their equipment. Attempting to preserve and then use this force after security is achieved is clearly the preferred approach, recognizing that there may be a need to purge some senior police leaders who had close ties to insurgents.
- If police have good intentions but poor capability, then HNG/coalition actions should avoid attacks on police personnel. After security is achieved, these police could be suitable recruits for a new police force.
- If police do not have good intentions but do have good capability, then the HNG/coalition actions should avoid attacks on police facilities and equipment. After security is achieved, the facilities and equipment would be useful in a new police force. Since the people had been part of an organization with a poor policing ethos, most of the police would not be suitable candidates for a new police force.
- If police do not have good intentions or capabilities, then the HNG/coalition does not have to exercise particular restraint toward the local police. After security is achieved, the police force would have to be rebuilt from scratch.

3. In situations where the people prefer insurgents to prevail but see their security already provided by the HNG and coalition forces, the issue is retaining HNG/coalition control of the security environment (box 3). Here the challenge is to transition security to the HNG in what is an unfriendly human environment...where lack of local support makes it that much harder to maintain security. Since the local human environment is hostile to the HNG/coalition, the use of non-kinetic resources (including for policing) should have priority, to encourage the people to be more supportive of the HNG. The actions to take about the police again depend on the local conditions:

   - If police have good intentions and capabilities, then the purpose of police-related actions should be to sustain this situation.
   - If police have good intentions but poor capability, then a high priority exists for inserting human and physical resources to improve capabilities. Doing this could help the people be more supportive of the HNG.

- If police do not have good intentions but have good capabilities, then a high priority exists for HNG authorities to act to restore an appropriate ethos to the police. Doing this could help the people be more supportive of the HNG.
- If the police do not have good intentions or capabilities, then a high priority exists for rebuilding the police from scratch. Doing this could help the people be more supportive of the HNG.

4. The worst case for the HNG/coalition is where the people favor insurgents to prevail and the people see their security provided by insurgents (box 4). This part of the human environment is not only bad, it is stable and particularly difficult to change. So, committing security forces to changing this part of the human environment should have the lowest priority and should wait until all the more profitable commitments of security forces have been made. For the same reason, this situation should have the lowest priority for actions to improve the policing environment.

In summary, in any situation, coalition actions related to policing should depend on the local policing environment:

- Where the people see their security provided by insurgents, then the critical coalition actions related to policing are those taken against police personnel, facilities, and equipment by HNG/coalition forces in the battles to restore security.
- Where the people see their security provided by the HNG/coalition, the immediate coalition actions related to policing must be those taken to end the systemic sources of corruption: money (e.g., HNG providing a living wage), coercion (e.g., HNG/coalition assuring protection of the family), and culture (e.g., local authorities encouraging a police ethos to serve and protect all the people).

Where the people see their security provided by the HNG/coalition, *and* the systemic sources of corruption are being addressed, then the critical coalition actions are to provide human and physical resources and to pressure HNG authorities to enforce counter-corruption measures. In this situation, new technologies can help. Some technologies are used by police in U.S. cities. Some have been introduced in selected U.S. military units. Some have been described in recent patents. All could be available over time to HN police, and tested for their usefulness, in a spiral development process.

V. VEHICLE IDENTIFICATION AND TRACKING

Summary

We examined the potential value of vehicle identification and tracking (VI&T) capabilities in irregular warfare, discussed challenges associated with the development of such capabilities, and suggested directions for initiatives. Effective VI&T systems could significantly improve IW capabilities on several levels including:

1. *Active Cooperative Tracking*[1] *of* ***All Friendly Official Vehicles****.* An extension of the current Blue Force Tracker (BFT) capabilities to include the automated, self-reported positions of vehicles of U.S. non-DoD agencies, coalition partners, host nation forces, IGOs, NGOs, and contractors could significantly increase coordination of activities, control of collateral casualties, and unity of effort. When employed by local security forces, it could improve their own security and responsiveness, and help deter corrupt activities. Existing cell-phone and Global Positioning System (GPS) technologies could provide the foundation for the VI&T system, which could augment, and perhaps be integrated into, BFT. A technical and operational challenge is maintaining operational security of the expanded system.
2. *Cooperative Tracking of* ***All Vehicles*** *in an Area of Interest.* Active cooperative tracking could be mandated for *all* vehicles in an area of interest. Non-reporting vehicles could be detected by other means [for example, portals, electro-optical/infrared (EO/IR) sensors] and detained. Alternatively, cooperative tracking could also be achieved by using passive (or semi-passive) coded transponders that are interrogated by ground and airborne sensors, which, in turn, transmit the identity and track of the target to a central location for processing and distribution. VI&T of all vehicles would (a) enable the interdiction of uncooperative vehicles, (b) force Red to use a "registered" vehicle, which is identified and tracked, (c) facilitate

[1] In this report: a "target" is any vehicle being tracked, whether friendly or hostile; an "active" system means the target emits a signal that is received by the tracking system; a "semi-passive" system means the target emits a signal only when interrogated by the tracking system; and a "passive" system means that the target does not generate its own signal. In addition, "cooperative" targets are controlled by individuals who are not trying to defeat the tracking system whereas "uncooperative" targets are trying to defeat the system.

forensic investigations by identifying all vehicles in an area (victims, suspects, witnesses) along with their track histories, and (d) facilitate precision targeting. This could greatly restrict Red's mobility and act as a strong deterrent to terrorist and criminal behavior. A "quick set-up" system coupled with controlled access techniques could be developed for limited areas with vehicles and occupants being identified on entry and vehicles tagged.

3. *Uncooperative Passive Tracking*. Uncooperative passive tracking could be enabled by covertly tagging specific vehicles and monitoring them using ground or airborne sensors. A number of technical approaches to covert tagging have been introduced and potential large-scale applications could be explored.

Most of the technologies required for the above capabilities are mature and affordable. Key needed initiatives include: (1) the integration of the new systems with existing command, control, communications, computers, and intelligence (C4I) systems; (2) the design of covert tags for large-scale operations against knowledgeable and wary enemies; (3) the management of the psychological and social aspects of balancing the desire for security with the desire for privacy in different cultures; (4) the anticipation of potential countermeasures to the VI&T systems and the methods with which to deal with them operationally and technically; and (5) the design of effective and affordable VI&T systems for transfer to host nation governments.

A. INTRODUCTION

The ability to isolate an enemy who is embedded in civilian society is critical to success in IW. Personal identification plays a central role, and biometrics is an essential tool. In addition to personal identification, VI&T also play key roles in providing security in any society where vehicles are important.[2] This chapter briefly reviews the nature of vehicle tracking and uses six criteria to guide the identification of promising directions for S&T initiatives aimed at improving VI&T capabilities in an IW environment.

B. NATURE OF VEHICLE IDENTIFICATION AND TRACKING

By "vehicle identification and tracking (VI&T)" we mean the ability to remotely determine the identification and location of a vehicle over time. The operational scenario; the range of the detection; the specificity of the identification; the accuracy of

[2] For example, vehicles are certainly important in Iraq, but may be less so in eastern Afghanistan.

the location; the completeness and continuity of the coverage; the processing, storage, and display of the information; and the connectivity to follow-up actions are all important aspects of VI&T systems.

C. LEVELS OF UNDERSTANDING PROVIDED BY TRACKING SENSORS

VI&T starts with vehicle *detection* and a sensor may provide many levels of understanding with regard to a detected target. We distinguish three such levels.

At the lowest level, a sensor may provide no information other than that a vehicle is present. This might be the case with a low-resolution sensor, which displays only a "blob" when a vehicle is detected. Tracking in this case depends on maintaining continuous, unambiguous contact with the target, and the classification of a target as potentially hostile depends on the target's observed activities. Forensic applications may be cued by a Red attack within the field of view of a sensor and subsequent tracking of suspicious vehicles.

Some sensors can provide additional levels of understanding beyond "detected." For example, higher-resolution sensors may be able to provide the *classification* of a target as a military truck vice a civilian car, or a white SUV vice a white Lumina. This information may enable a track to be maintained despite brief gaps in coverage or the presence of background traffic.

The highest level of understanding is *identification*—knowing the target to be a unique vehicle. A sensor that provides identification can maintain track despite coverage gaps, can focus on specific vehicles in heavy traffic, and can provide handoffs much more easily than the lower-level sensors. BFT is an example of a system based on "identified" contacts.

Many current sensor systems used for the surveillance of vehicles in theater can classify potentially hostile targets to various levels of specificity. Providing the front end of a surveillance system with a unique remote identification capability could vastly improve the effectiveness of all elements of the system.

D. TARGET TYPES[3]

There are two types of targets for VI&T systems: cooperative and uncooperative. Clearly the challenge is much greater for uncooperative targets that are hostile to Blue interests and trying to defeat the system.

A target may also be designated as *active* (target emits a signal); *semi-passive* (target emits a signal when stimulated by an interrogating signal); and passive (target does not emit a signal).

1. Cooperative Targets

Examples of VI&T systems for cooperative targets are discussed below.

a. Blue Force Tracker (Active)

BFT, mentioned above, is the prime example of an active military VI&T system for cooperative targets. Each Blue vehicle automatically transmits its GPS location via satellite or line-of-sight communications to a central system for processing, display, and transmission. The locations of other vehicles, features, or conditions can also be manually entered into the system. Civilian examples of tracking systems for cooperative targets include truck monitoring systems[4] and the OnStar[5] location and communication system for cars.

b. Radio Frequency Identification (RFID) (Semi-Passive)

RFID is another example of a location and identification technique for cooperative vehicles. For example, the E-ZPass system uses a small transponder on the windshield that can be activated by an external antenna as the vehicle passes through a portal. In general, battery-powered RFID transponders can be read up to 100 meters away and unpowered transponders (which depend on the reading antenna for transmission power), up to about 5 meters.[6]

c. Passive Tagging (Passive)

The basic cooperative, passive, VI&T device is the familiar license plate designed to be read by a human at ground level from behind, or ahead of, a vehicle. Recent

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3 As used here, a "target" refers to any vehicle tracked by the tracking system, friendly or hostile.

4 See, for example, the FleetGPS website: http://www.fleetgps.com/.

5 See, for example, http://auto.howstuffworks.com/onstar.htm.

6 See, for example, http://electronics.howstuffworks.com/rfid.htm.

domestic developments have enhanced this capability by the introduction of automated license plate readers used to scan passing traffic or lines of parked cars. In addition, the use of cameras to record license numbers at intersections and toll gates is becoming common.

d. Applications of Cooperative Systems

Although conventional license plates can be quite helpful if their use is accepted and enforced in an IW environment, improved performance could be provided by a "license plate on steroids" that could facilitate more remote VI&T. Examples include large Metro-bus-like numbers on the roofs of vehicles. These numbers can be scanned by electro-optical, infrared, radar, multispectral, or hyper-spectral sensors, which could be a mix of ground-based and air-based devices. Such tags could be visible or invisible, day/night, all-weather, and resistant to obscuration by dirt and grime. Alternatively, other devices such as coded corner reflectors could be used to characterize signal returns. Such enhanced signatures that uniquely identify vehicles would provide a strong basis for universal tracking.

Even though restricted to cooperative targets, existing VI&T systems can contribute to security and stabilization in an IW environment. For example, the expansion of VI&T capabilities beyond U.S. military vehicles to vehicles of the coalition, IGOs, HNG, NGOs, and supporting contractors could greatly enhance coordination and unity of effort. A technical and operational challenge would be the integration of a civilian VI&T system with BFT in a way that preserves the security of BFT.

In principle, one can consider mandating that all vehicles in a given area either continuously transmit their positions and identity or periodically pass through sensing portals distributed throughout the area. This may be especially feasible in a limited area, with entry restricted to cooperative "resident" vehicles and with visiting vehicles being tagged on entry. Current cell-phone-based GPS location information could provide a low-cost foundation for such a system.[7]

[7] See, for example, http://www.loopt.com/ for a description of a cell-phone location system.

2. Uncooperative Targets

a. Two General Approaches

Two general approaches exist for identifying uncooperative targets: overt and covert. In the former case, the approach is to isolate uncooperative targets by overtly tagging *all* cooperating (background) traffic. (As in the United States, this makes a car without a license plate subject to being stopped by police and cars or license plates reported stolen to become the objects of an active search.) In addition, individuals with prior arrests/detentions could have their vehicles tagged as a condition of release.

The second approach is to tag vehicles covertly. These include (1) active systems with transmissions that are stealthy (e.g., noise-like, or riding on natural emissions from the vehicle); (2) stealthy semi-passive systems that can be interrogated by a stealthy external transmission; or (3) passive systems that can be read by a remote detector such as coded electronic reflectors, chemical paints that can be read remotely using various electromagnetic frequencies, high resolution three-dimensional sensors to capture shape characteristics, etc.

3. Countermeasures

Countermeasures pose a central challenge to both cooperative and uncooperative approaches to vehicle identification and tracking. A dynamic interplay between Blue and Red is to be expected. Performance monitoring is essential, and adaptability in the face of counters must be swift. Countermeasures must be considered from the onset of system development and continuous red-teaming must be a component of any VI&T system.

E. CRITERIA FOR DEVELOPMENT

Six criteria are used in this chapter to guide the identification of promising directions for S&T initiatives:

1. The desired capabilities are *operationally important.*
2. The desired capabilities are *widely applicable.*
3. Current capabilities *need significant improvement.*
4. Significant *improvement is feasible*:
    a. Operationally suitable and supportable.
    b. Acceptable technical risk.
    c. Affordable.
5. Improvements are *not being adequately addressed* by other efforts.

6. Program initiatives are *consistent with the charter of the proposed research and development (R&D) portfolio*:
    a. S&T plays an important role.
    b. Likely to find follow-up sponsor (someone who cares).

In the following sections, we discuss capabilities to identify and track vehicles with respect to each of these criteria.

1. Operationally Important

The population is the "center of gravity" in IW, and capabilities to understand and shape the "human terrain" are essential for success.

Understanding begins with identification—simply knowing who is who—but also includes personal history, location, movement, communications, associations, and attitudes. An ideal intelligence system would provide complete information on all of these, but in practice only snippets of information are available.

In IW, all actors (Red, Blue, population[8]) share the same environment. Red has, on the one hand, the advantage that his activities are masked by a complex background of other day-to-day activities, but, on the other hand, the disadvantage that Blue has access to his operating areas. Historically Blue has used this access to restrict Red's activities by channeling public movement and using checkpoints and personal identification to capture or deter Red. In environments where vehicles are important, the corresponding capabilities to identify, track, and isolate vehicles can provide a profound advantage to Blue by (1) facilitating the identification and detention of Red, (2) restricting Red's mobility, (3) providing "smoking gun" forensic evidence following hostile events, and (4) deterring hostile actions in areas that are covered.

In short, an effective VI&T system has the potential of becoming a "revolutionary" capability in IW.

2. Widely Applicable

As stated previously, VI&T is important in any IW scenario where vehicles are an important element of society. This includes counterinsurgency, counterterrorism, and

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[8] The authors acknowledge that the terms "Red" and "Blue" are taken from the traditional language of regular warfare and kinetic operations whereas distinguishing the actors in IW can be much more subtle. Nevertheless, we use this convenient shorthand with the understanding that "Red" and "Blue" refer broadly to adversaries and friendly actors, respectively.

counter-crime scenarios. If S&T solutions can be transferred to coalition partners and/or to the HNG, then the applicability of the solution is further enhanced. In addition, VI&T is broadly applicable to homeland security, civilian law enforcement, and special operations.

Table 9 is based on the general framework of IW capabilities described in Chapter I. It is a matrix in which a given IW capability may be entered according to its type (e.g., Shape-Blue in the first two columns) and the Distinguishing Attribute of IW that it addresses (e.g., Human Terrain in the top row). This matrix can be used to illustrate the breadth of a capability's applicability to IW. For example, the capability to provide coalition forces with improved vehicle protection against improvised explosive devices (IEDs) would be entered in a single cell at the intersection of the "Shape-Blue" row and "IW Combat Ops" column. On the other hand, providing improved translation skills to coalition forces would apply to the majority of the cells.[9] Table 9 lists a wide range of applications of VI&T to IW. Some examples are discussed in the following.

Table 9. Examples of Capabilities Facilitated by VI&T

	Human Terrain	Civilian-Military	IW Combat Ops	Consolidation	Transition
Environment[a]					
Understand	Economic Activity		Traffic Patterns		
Shape	Planning Tool		Traffic Control		
Population					
Understand	Census, Activities	Activities	Track Civ. Traffic	Track Civ. Traffic	
Shape	Traffic Control	Planning	Reduce Civ. Cas.	Traffic Control	
Host Nation Government					
Understand	Track Pub. Service	Activities	Track HNG Force	Track Police	
Shape	Responsiveness	Planning	C2	Deter Corruption	
Red					
Understand	Track Activities		Track Red		
Shape	Isolate Red		Deter Red Mobility	Border Control	
Engage			Target Red		
Blue					
Understand		Track Coalition	Blue Force Track	Track Coalition	
Shape		Coordination	C2, Planning	Coordination	

[a] Physical, economic, cultural, political, informational, technological, diplomatic, etc.

a. IW Combat Operations

The primary application of VI&T relates to IW combat operations against Red with examples listed in the fourth column of Table 9. Reading down from the top:

[9] Of course breadth is only one factor in assessing the overall importance of a capability.

1. General vehicle tracking can reveal patterns in normal background traffic and enable the planning and execution of traffic control in support of counter-Red operations.
2. Real-time mapping of civilian traffic can provide cues to Red activities, assistance to response operations, and information that could mitigate collateral damage.
3. A capability analogous to BFT for the HN security forces (perhaps based on cell-phone/GPS technology) could enable the HN to track its own forces in real time and greatly improve its capabilities for command and control, responsiveness, and self protection.
4. The capability to identify and track individual vehicles would revolutionize Blue's capabilities to maintain track on suspicious vehicles, conduct forensic investigations (including identifying possible witnesses), deter Red's mobility, and provide targeting information for strikes against individual vehicles.
5. Improvements in active VI&T capabilities could enable Blue to extend BFT capabilities to all members of Blue including other agencies, coalition partners, IGOs, NGOs, and contractors.

b. Non-Combat Operations

In addition to significantly improving operational effectiveness in countering Red forces, VI&T offers a number of other contributions to overall IW effectiveness. A number of these are also listed in Table 9 and four examples are mentioned here.

1. Observations of traffic patterns can help gauge the level of security that is perceived by a population as well as economic trends.
2. Civilian vehicle registration contributes to police efforts to control traffic and counter criminal activities.
3. Vehicle tracking can help the HNG dispatch public service vehicles and improve responsiveness.
4. Tracking HN police vehicles not only can provide a better security environment for the police, but can also deter corrupt practices by the police.

c. Transition

Capabilities that are transferable to the HNG are essential for a successful transition. In some cases, coalition resources can be left behind, but in others, alternative approaches must be developed consistent with the HN's economy, personnel capabilities, and operational realities. For example, although a BFT system may not be appropriate to

leave behind, an analogous system based on cell-phone and GPS technology may provide an effective VI&T capability.

3. Current Capabilities Need Significant Improvement

a. Blue Force Tracker

BFT is the most highly developed vehicle tracking system currently in the U.S. force. It is based on the self-reporting of GPS position information by each participating vehicle over a communications network (satellite-based or line-of-sight), and the input is displayed in a common "picture," which is distributed to the force. In addition, the positions of non-participating entities (such as Red vehicles) observed by Blue may also be manually entered into the common picture.

BFT has provided a dramatic improvement in the command and control capabilities of U.S. forces. However, it has not been extended to include vehicles of other cooperative partners (such as U.S. non-DoD agencies, coalition members, HNG, IGOs, and NGOs). Furthermore, since BFT is a cooperative system, it cannot automatically identify and track non-cooperating traffic and thereby isolate Red (or suspect) vehicles from the background in an IW environment.

b. Airborne Tactical Surveillance

Both manned and unmanned airborne surveillance of vehicular traffic are currently being used in theater. Detection systems include Ground Moving Target Indicator (GMTI) radar, Synthetic Aperture Radar (SAR), and electro-optical/infrared (EO/IR) sensors including full motion video.

GMTI systems were originally designed to detect the movement of large numbers of vehicles in a regular warfare environment. They have limited single-vehicle identification capability, and their ability to maintain track of a single vehicle is severely degraded by the amount of background traffic, line-of-sight interruptions, and the requirement that the target continues to move.

Other radar and EO/IR surveillance systems, both airborne and ground-based, are currently being used in theater both to detect suspicious activity and to conduct post-attack forensic analyses. However, their abilities to identify specific vehicles and maintain continuous contact over broad areas are limited by their resolution, gaps in coverage, handover challenges, line-of-sight interruptions, and contact ambiguities exacerbated by heavy background traffic.

c. Tagging

As discussed above in Section C, a number of marking or tagging systems, both overt and covert, are available for special uses. However, these have not generally been applied to the identification of large numbers of vehicles in an IW environment.

4. Significant Improvement Is Feasible

Based on the current state of VI&T technologies and the common use of such technologies in the commercial sector, it is clear that significant improvement in IW applications is feasible.

a. Operationally Suitable and Supportable

The types of ground and airborne surveillance platforms needed for a VI&T system are already operating in theater. The force levels, sensor suites, processing, and distribution of information must be addressed. A demonstration program in a limited area could be a first step.

Two overarching operational-level issues must be addressed before deploying a VI&T system: security versus privacy, and countermeasures.

Security vs. Privacy. A universal, overt tagging program must have the cooperation of the local population, and popular support will depend on the perceived need for increased security versus the potential risks that a loss of privacy might entail. For example, in the United States essentially everyone agrees that license plates are a good thing. However, some members of the population strongly oppose the use of automatic cameras and scanning devices for law enforcement purposes.

In an IW environment, the support of the population is contested by the HNG and Red (often through intimidation). In some cases, the use of overt tags could actually decrease the security of a vehicle owner who thereby might be marked for retribution by Red. The decision to deploy a VI&T system and select its characteristics must be informed by an understanding of the local balance between the need for security and the desire for privacy. It may be that the use of overt tagging systems is better suited for the "consolidation" phase of IW when a clear majority of support for the HNG is emerging. In any case, an improved understanding of the social conditions that are conducive to the use of various types of tagging systems is needed.

Countermeasures. As noted previously, a second key overarching operational issue concerning the use of VI&T systems is countermeasures. No matter what system is

deployed, the opposition will attempt to frustrate it using the full spectrum of counters: destroy, deny, degrade, deceive, etc. Therefore, each proposed scenario, system, and operating concept must be "red-teamed" to identify potential countermeasures (CM); then counter-countermeasures (CCM) must be identified both before development and fielding, and throughout operations. In addition to changes in tactics, techniques, and procedures, the systems themselves will have to evolve to counter Red CM as they emerge. There is a strong analogy here to the evolution of the Counter Radio-Controlled-IED Electronic Warfare (CREW) program in response to insurgent CM in Iraq. (However, in this case, it is important to note that Red would be on the defensive.)

b. Acceptable Technical Risk

As evidenced by current commercial applications, the technical risks associated with cooperative systems are very low. For uncooperative systems, a number of covert tagging devices have been developed. However, the large-scale use of such devices when Red is likely to be aware of Blue efforts to track vehicles presents a combined operational and technical challenge. Developmental work in this area is needed.

c. Affordable

Experience with commercial systems and low-volume production of covert tagging devices provides a basis for reliable cost estimates. Indications are that even extensive VI&T systems would be affordable by U.S. standards. Systems developed for less-developed nations may have to be specially designed to meet affordability requirements.

5. Improvements Are Not Being Adequately Addressed by Other Efforts

Initiatives are underway to improve commercial and military cooperative VI&T systems and tagging technologies for special uses. However, this review did not find any efforts focused on development of a comprehensive VI&T system for use in an IW environment.

6. Consistent with Charter of R&D Portfolio

Clearly, S&T initiatives will play an important role in developing an operationally effective, comprehensive VI&T system. These initiatives will include not only technical advances in sensors, platforms, and processing, but also new insights into the social acceptance of tracking systems when there is a security threat. Also, the close interplay

of technology with operational measures and countermeasures makes this area especially appropriate for DoD to pursue.

If initial efforts support the potential of this approach, finding investment partners in DoD and elsewhere should be likely.

F. SUMMARY OF CONCEPTS FOR EMPLOYING VI&T CAPABILITIES

This section summarizes several concepts for employing VI&T capabilities.

1. Active Cooperative Tracking of All Friendly Official Vehicles

Active cooperative tracking is being performed now by U.S. military forces in theater in the form of BFT. It is desirable to extend this capability to other friendly elements (U.S. interagency, coalition partners, HNG, IGOs, NGOs, and contractors.) This augmentation of BFT could be achieved with existing technology (for example, cell phones and GPS). The technical challenge would be to integrate the new coverage into the BFT system while preserving operational security. Benefits include (1) improved command, control, and coordination of all Blue members; (2) improved security for HN military and police forces; (3) improved deterrence of corrupt activities by HN military and police forces; and (4) improved responsiveness of HN public service vehicles.

2. Cooperative Tracking of All Vehicles in an Area of Interest

Active cooperative tracking could also be mandated for *all* vehicles in an area of interest. Non-reporting vehicles could be detected by other means (for example, portals, EO/IR sensors) and detained.

Cooperative tracking could also be achieved by using passive (or semi-passive) coded transponders that are interrogated by ground or airborne sensors which, in turn, transmit the identity and track to a central location for processing and display.

The identification and tracking of all vehicles would (1) enable the interdiction of uncooperative vehicles, (2) force Red to use a “registered” vehicle, which is identified and tracked, (3) facilitate forensic investigations by identifying all vehicles in an area (victims, suspects, witnesses) along with their track histories, and (4) facilitate precision targeting. This could greatly restrict Red’s mobility and act as a strong deterrent to terrorist and criminal behavior. A “quick setup” system coupled with controlled access techniques could be developed for limited areas with vehicles and occupants being identified on entry and vehicles tagged.

3. Cooperative Tracking of Selected Vehicles

Under this concept selected vehicles would be tagged with the knowledge of the owner. In this way, for example, detainees could be released under the condition that they would agree to have their vehicle tagged, subjecting it to identification and tracking.

4. Uncooperative Passive Tracking

Uncooperative passive tracking could be enabled by covert tagging of specific vehicles along with monitoring by ground or airborne sensors. A number of technical approaches to covert tagging have been introduced, and potential large-scale applications could be explored.

G. CONCLUSIONS

We have reviewed the status of VI&T capabilities and concluded that significant improvements in current IW effectiveness could be achieved by further developing and employing these capabilities.

An extension of BFT-like capabilities to non-DoD agencies, coalition partners, the HN, and other supporting organizations could contribute significantly to their unity of effort, improve security and public services, and deter corrupt activities.

A further application of cooperative vehicle identification and tracking technologies to *all* vehicles in an area of interest would greatly restrict Red's mobility and freedom of action and would provide vastly improved forensic capabilities. This could be achieved either by an active reporting system (like BFT) or by a passive transponder system with coverage by ground and airborne sensors.

Finally, covert tagging with ground and airborne monitoring could be employed for selected vehicles, and considered for large-scale usage.

Most of the technologies required are mature and affordable. Two technical challenges are the integration of the new systems into the existing C2 systems, and designing covert tags for operations against knowledgeable and wary enemies. Other challenges focus on understanding how to manage the psychological and social aspects of balancing the desire for security with the desire for privacy, and how to anticipate potential countermeasures to the tracking systems and deal with them operationally and technically.

Appendix A

GLOSSARY

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GLOSSARY

AI	artificial intelligence
ANA	Afghanistan National Army
ANP	Afghanistan National Police
BFT	Blue Force Tracker
C2IEDM	Command and Control Information Exchange Data Model
C4I	command, control, communications, computers, and intelligence
CCM	counter-countermeasure
CM	countermeasure
COIN	counterinsurgency
CPI	Corruption Perception Index
CREW	Counter Radio-Controlled-IED Electronic Warfare
CSTC-A	Combined Security Transition Command–Afghanistan
DAPSE	Deterrence Analysis and Planning Synthetic Environment
DAWG	Deputy's Advisory Working Group
DDR&E	Director of Defense Research and Engineering
DIA	Defense Intelligence Agency
DOTMLPF+	Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities plus other areas such as planning, policy, inter-agency and multinational coordination, and experimentation
DQRS	Data Quality Reference Site
EO	electro-optical
EU	European Union
FSI	Failed States Index

GCB	Global Corruption Barometer
GDDS	General Data Dissemination System
GMTI	Ground Moving Target Indicator
GPS	Global Positioning System
GTD	Global Terrorism Database
HN	host nation
HNG	host nation government
HQ	headquarters
HRAF	Human Relations Area Files (Yale University)
HSCB	Human Socio-Cultural Behavior
IA	Internal Affairs
IASC	Inter-Agency Standing Committee
IBP	Innovation Business Partners, Inc.
IDV	Individualism Index
IED	improvised explosive device
IGO	inter-governmental organization
IMF	International Monetary Fund
IR	infrared
IW	Irregular Warfare
JFC	Joint Force Commander
JIMM	Joint, Inter-Agency, Multinational, Multilateral
LTO	Long Term Orientation
MAPS	Marrakech Action Plan for Statistics
MAS	Masculinity Index
MCIA	Marine Corps Intelligence Activity
MIDB	Military Intelligence Database
MNIS	Multi-National Information Sharing
MPICE	Measuring Progress in Conflict Environments
NATO	North Atlantic Treaty Organization

NCES	Net-Centric Enterprise Services
NGA	National Geospatial-Intelligence Agency
NGO	non-governmental organization
OCM	Outline of Cultural Materials
PARIS21	Partnership in Statistics for Development in the 21st Century
PDI	Power Distance Index
PPP	Purchasing Power Parity
R&D	research and development
RFID	radio frequency identification
RW	Regular Warfare
S&T	science and technology
SAR	Synthetic Aperture Radar
SDDS	Special Data Dissemination Standard
SEDRIS	Synthetic Environment Data Representation and Interchange Specification
SHAPE	Supreme Headquarters Allied Powers Europe
SME	subject matter expert
START	Study of Terrorism and Responses to Terrorism
TTL	tag, track, and locate
UAI	Uncertainty Avoidance Index
UN OCHA	United Nations Office for the Coordination of Humanitarian Affairs
UoE	unity of effort
USAID	U.S. Agency for International Development
USG	U.S. Government
USSTRATCOM	U.S. Strategic Command
VI&T	vehicle identification and tracking

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Appendix B

LIST OF FIGURES AND TABLES

Appendix B
LIST OF FIGURES AND TABLES

LIST OF FIGURES

LIST OF TABLES

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14. ABSTRACT

"Kinetic" capabilities focus on destroying enemy forces using physical effects. This study takes "non-kinetic" irregular warfare (IW) capabilities to be all other capabilities relevant to IW. Examples include understanding and gaining support of the population, partnering with interagency and coalition members, and strengthening the legitimacy of the Host Nation Government. Non-kinetic capabilities are *not* traditional focal points for DoD development programs, but, if experiences during the first decade of the 21st century are indicative of future national needs, then DoD must improve such capabilities. Such improvement will require initiatives across the full range of DOTMLPF+ categories (doctrine, organization, training, materiel, leadership & education, personnel, facilities plus other areas such as planning, policy, interagency and multinational coordination, and experimentation.) In particular, a key question is "How should DoD's investments in science and technology (S&T) be modified to better address the emerging needs for improved non-kinetic capabilities?" This study explores four key non-kinetic focus areas of IW: influencing the population; unity of effort in civilian-military actions; countering corruption in host nation police forces; and vehicle identification and tracking. In each case, the study examines the structure of the focus area, identifies key capabilities, and suggests directions for S&T initiatives including both traditional applications of physical sciences and engineering as well as applications of life, psychological, and social sciences.

15. SUBJECT TERMS

irregular warfare; non-kinetic capabilities; influence operations; human terrain; interagency; unity of effort; civil-military actions; corruption; host nation police forces; vehicle identification and tracking; science and technology applications; social science applications; modeling and simulation; force planning; national security policy

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